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SOCIAL ATTITUDE CONFIGURATIONS IN AN ADOLESCENT GROUP*

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A. INTRODUCTION

Research relating to the relationship between certain social attitudes and their intrapersonal determinants presented in *The Authoritarian Personality* (1) has generally followed a single experimental paradigm: groups of "highs" and "lows" (based on extreme scores, usually on only one of the attitude scales) are established and variables which discriminate these groups are sought. The results of these investigations, at best, point to low order relationships. We suggest that such studies make a certain set of rarely explicit, and even less frequently supported, assumptions which, being unjustified for their particular data, tend to obscure relationships. Briefly put, these assumptions are that the attitudinal dimension purportedly measured by the particular scale actually exists for the population in question, that the scale is an appropriate measuring instrument in this population, and that a single scale score can legitimately characterize the full pattern of response to individual items.

With reference to the first two assumptions, the generalizability of the three *UCPOS* scales [ethnocentrism (*E*), authoritarianism (*F*), and political-economic conservatism (*PEC*)] to new populations must be seriously questioned in light of the demonstrated variability in the dimensional structure of the scales in different samples (3, 5, 9). We consider this problem of scale generalizability in detail in another report (7).

The third assumption would seem to claim its justification from *The Authoritarian Personality* conclusion that their data demonstrate a "close correspondence in . . . outlook a subject is likely to have in . . . relationships to other people in general, to religion, and to social and political philosophy" (1, p. 971). Such an assertion of a high degree of attitude generality seems unjustified from a consideration of the positive, but quite variable and sometimes low-order, intercorrelations reported for the three scales in a wide variety of samples. The general assumption seems to be that any person will maintain about the same relative position along the three attitude scales;

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his scale score profile would be flat. While there exist scattered references throughout the book to "atypical" subjects (those whose profiles were not flat), the treatment of such instances is only cursory. Analysis is sharply focused upon the two "pure types": the "high" who exhibits a flat, high elevation (i.e., high scale mean) profile on the three scales and the "low" who manifests a flat, low elevation profile. If we disregard profile elevation, it becomes clear that, for all practical purposes, the persons intensively studied in *The Authoritarian Personality* represent a single attitudinal profile which is characterized by a constancy of relative position on the three social attitude scales. If, in fact, subsequent studies drew their samples from such a population, it would indeed be proper and efficient to permit the full set of item responses to be summarized by a single scale score.

However, and unfortunately, the experimental progeny of *The Authoritarian Personality* more often assume high attitude generality rather than independently evaluating the validity of this assumption in their own sample. Therefore, insofar as this assumption remains moot, we must consider as still relevant the suggestion by Hyman and Sheatsley that "in view of the express interest of the project [The Authoritarian Personality] in the problem of mental organization, it seems to us that there would have been considerable wisdom in a deliberate study of contrasted groups varying in the profiles of their sentiments" (6, p. 100). Furthermore, we suggest that this univariate approach to the characterization of a person's social attitudes has contributed critically to the relative failure of subsequent experimentation to realize fully the theoretical potential of the undeniably rich hypotheses presented in *The Authoritarian Personality*.

The representation of responses to a diverse complex of specific attitudinal items by a single score renders inaccessible to investigation the patterning of social attitudes. It is the thesis of this study that the attitudinal responses will be characterizable by certain psychologically cohesive configurations or patterns and that such an analysis will more accurately, subtly, and thus more heuristically, describe the structure of social attitudes.

B. Problem

The purpose of the present study is to determine whether there are systematically differing patterns of response to a questionnaire composed of *E*, *F*, and *PEC* items in a group of adolescent boys. If such patterns can be demonstrated, the inefficiency of employing a single score to summarize response to the entire questionnaire would be indicated. Failure to detect such patterns would suggest that variations in patterning are insufficiently systematic to contribute usefully to the description of the social attitudes of a group of respondents, and, in that event, it would be legitimate to assume that single composite scores convey all of the relevant information concerning interperson variation in attitudes.

A person cluster analysis was performed on the matrix of correlations among all possible pairs of item response arrays, each correlation assessing the response similarity for a given pair of persons. Individual item patterns rather than scale score profiles were correlated in order to avoid making the risky assumption that the three scales were adequately homogeneous for our particular sample and to make possible the detection of more subtle pattern differences. If there is sufficient communality in item patterns so that only a few basic patterns exist, then these patterns will be found by this cluster analysis and can be described by inspection of the actual modal item response patterns. The psychological consistency of these patterns can be determined from these descriptions, which, in turn, may suggest the possible determinants of such attitudinal configurations in our particular group.

C. METHOD

1. *Subjects*

The sample consisted of 43 boys ranging in age from 16.5 to 19.3 years (mean 17.4; *SD* .72). These individuals are part of a larger sample who participated in the Guidance Study of the Institute of Child Welfare whose purpose was to investigate various aspects of physical, mental, and personality development from birth through the eighteenth year. This original sample is representative of the population of children born in Berkeley, California, between January, 1928, and June, 1929. Berkeley is an urban community in which is located a large state university. At the beginning of the Study, the parents of these children were shown to be above the U. S. average of formal education, although somewhat below the national average in income. Warner's Ratings of Social Class Status (10) indicate a slight excess of middle class over lower class families. For a detailed description of the original sample, see 8 (pp. 19-20).

The present sample contained all boys who completed the social attitude questionnaire which was administered between July, 1945, and December, 1947.[1] Our sample differs from the original group primarily in exhibiting an increased preponderance of middle class families since socio-economic status appeared to be the variable most related to the sample attrition which occurred during the course of the Guidance Study. By the Warner rating, 65 per cent of these families were Middle Class, 21 per cent were in the Upper Upper Lower category, and the remaining 14 per cent were below this rating. The inclusion of one hypothetical protocol[2] raised the total N to 44.

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[1] Note the importance of interpreting item responses, especially for the *PEC* items, within the framework of climate of opinion in the U. S. in the period during which the responses were obtained. Several events which seem immediately relevant to some of the items occurred within the testing period, e.g., the end of World War II and the consequent relaxation of governmental controls, the return of the Japanese

2. *Data*

The social attitude questionnaire consisted of 46 items (11 E items, 24 F items, and 11 PEC items) drawn from the several E, F, PEC scales reported in *The Authoritarian Personality*. Most of these items were used verbatim; a few were revised primarily in order to include a number of items for which agreement connoted a "favorable" attitude. A six-point response scale was used ranging from "I agree very much" through "I disagree very much." There was no middle category so that no neutral response was possible. As in the original study, a 1-7 scale was used in scoring.

D. RESULTS OF CLUSTERING

Intercorrelations among the item patterns of the 44 persons were computed and an inverse cluster analysis of the resultant correlation matrix was performed which followed the Tryon correlational profile method with one important modification; namely, a more objective procedure for establishing clusters was substituted for the usual technique for matching correlation profiles. This consisted of computing a second matrix which contained the correlations of each person's correlational profile with that of every other person. Thus an objective measure of the similarity between any two correlational profiles was available for clustering persons. The criteria for the inclusion of a person in a cluster were that the median correlation of his correlational profile with those of the other cluster members be at least .31 ($P = .05$ for N of 44) and that this median correlation be higher with the members of his cluster than with the members of any of the other clusters. These criteria insure that no person would be assigned to more than one cluster.

This cluster analysis grouped the 44 subjects into three clusters which are

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to California, the gradual worsening of relations with the *USSR*, the founding of the *UN*, the Taft-Hartley bill, and the probable modification of the public conception of science and scientists as a function of atomic research developments.

[2] This protocol was a composite based upon the pooled guessed responses of the two authors to the questionnaire, taken with the attitude of "making a good impression." It was included in the analysis for purposes not relevant to the present problem and is not explicitly treated in this paper.

hereinafter designated as Cluster *A* ($N = 21$), Cluster *B* ($N = 14$), and Cluster *C* ($N = 5$). Four subjects failed to meet the criteria for inclusion in any of the clusters. The characteristic item response pattern for each cluster and for the group as a whole is provided by the computation of the mean group response to each item. The item standard deviations indicate the degrees of homogeneity of response within each group. These data are presented in Table 1.

The grand mean of all item means for the total group is 3.9: 22 per cent of the item means fall in the bottom third of the seven-point scale; 54 per cent fall in the middle third; and 24 per cent in the upper third. Such distribution of item means suggests that our sample was not deviate with respect to their modal attitude level, a point to be taken into account in the interpretation of the attitude configurations. The few instances of extreme item means (and hence small variability) occur, as will be indicated in the following section, on items which are likely to have special meanings for an adolescent group.

As might be expected for a relatively homogeneous group, the three attitude patterns, while statistically discriminable, are nevertheless quite similar to one another. The degree of intercluster similarity can be expressed by the correlations among the item mean patterns of the three clusters. These are as follows: Cluster *A* x Cluster *B*, $r = .74$; Cluster *A* x Cluster *C*, $r = .61$; Cluster *B* x Cluster *C*, $r = .60$. An examination of the items in Table 1 manifesting little variation among the three cluster item means will serve to delineate the response pattern common to all clusters and thus describe the "core" attitudinal configuration for this sample.

E. Item Discrimination Among Clusters

Our attention now focuses on what is unique in the response patterns of each cluster. The characteristic pattern for each cluster may be most easily described by an inspection of the items which show relatively large intercluster item mean variability. While differentiating items are identified by a relativistic criterion, i.e., the position of the cluster item mean relative to the other two item means, it should be emphasized that the *aboslute* level of agreement, considered in reference to the seven-point response scale, should also enter into the interpretation of each cluster's response pattern. We have employed a rather informal descriptive criterion for intercluster item discrimination, i.e., that the cluster item mean must deviate at least one scale point from at least one other item mean. This appears to us to have some face validity since a single scale point coresponds to the "*j.n.d.*" re-

TABLE 1

E, *F*, AND *PEC* SCALE ITEM MEANS AND STANDARD DEVIATIONS FOR THE TOTAL GROUP AND THE THREE CLUSTERS
(Degree of agreement was recorded on a seven-point scale*)

Item No.**	Item		Total group (N=44)	Cluster		
				A (N=21)	B (N=14)	C (N=5)
E-Scale Items						
1.	Negroes have their rights, but it is best to keep them in their own districts and schools and to prevent too much contact with Whites.	M	4.5	3.4	6.1	5.0
		SD	*2.4*	*2.3*	*1.4*	*2.5*
6.*	All loyal Japanese should be allowed to return to California now.	M	2.5	2.0	2.3	4.2
		SD	*1.9*	*1.4*	*1.8*	*1.5*
14.	It would be a mistake ever to have Negroes for foremen and leaders over Whites.	M	3.9	2.7	4.4	6.6
		SD	*2.3*	*2.0*	*2.0*	*0.5*
15.	There may be a few exceptions, but in general, Jews are pretty much alike.	M	4.0	2.8	4.4	6.4
		SD	*2.2*	*2.0*	*1.7*	*0.5*
18.	If Negroes live poorly, it's mainly because they are naturally lazy, ignorant and without self-control.	M	3.2	2.8	3.9	3.0
		SD	*2.1*	*2.1*	*1.9*	*1.1*
22.	Zootsuiters and people of their type who have too much money and freedom take advantage and cause trouble.	M	5.5	5.2	5.6	6.0
		SD	*1.7*	*1.9*	*1.5*	*0.6*
30.	For the good of all, the Oklahomans ("Okies") who recently flooded California ought to be sent back home as soon as possible.	M	3.6	3.0	4.3	4.6
		SD	*2.0*	*1.8*	*1.7*	*2.2*
36.	The worst danger to real Americanism during the last 50 years has come from foreign ideas and agitators.	M	4.0	3.4	4.2	4.8
		SD	*1.9*	*1.8*	*1.7*	*1.5*
39.	The trouble with letting Jews into a nice neighborhood is that they gradually give it a typical Jewish atmosphere.	M	3.1	2.2	4.1	4.2
		SD	*1.9*	*1.4*	*1.9*	*1.9*
40.*	I can easily imagine myself marrying a Jew.	M	4.4	3.3	5.4	6.4
		SD	*2.1*	*2.1*	*1.6*	*0.8*

*Agreement with asterisked items is indicated by a low item mean; for all other items, the higher the mean the greater the agreement.

**These item numbers refer only to the order of the items in the present questionnaire.

TABLE 1 (*continued*)

Item No.**	Item		Total group (N=44)	Cluster		
				A (N=21)	B (N=14)	C (N=5)
46.	One trouble with Jewish business men is that they stick together and prevent other people from having a fair chance in competition.	M	4.0	3.4	4.6	5.4
		SD	*1.8*	*1.8*	*1.6*	*1.4*
F-Scale Items						
2.	The trouble with letting everybody have a vote is that so many people are just naturally stupid or full of wild ideas.	M	2.8	2.6	2.8	3.2
		SD	*1.8*	*1.8*	*1.5*	*1.5*
3.	The wild sex life of the old Greeks and Romans was tame compared to some of the goings-on in this country, even in places where people might least expect it.	M	4.4	4.4	3.6	5.8
		SD	*2.0*	*1.8*	*1.9*	*0.8*
5.	A person who has bad manners, habits and breeding can hardly expect to be liked and accepted by decent people.	M	5.4	5.8	6.1	4.2
		SD	*2.1*	*1.9*	*1.6*	*2.4*
7.*	The Germans are just as brutal as the Japs.	M	2.5	1.9	2.6	2.6
		SD	*2.0*	*1.5*	*1.9*	*2.3*
8.	Nowadays when so many different kinds of people move around so much and mix together so freely, a person has to be especially careful to protect himself against infection and disease.	M	5.4	5.8	4.6	5.6
		SD	*1.8*	*1.6*	*1.8*	*2.0*
12.	No sane, normal, decent person could ever think of hurting a close friend or relative.	M	5.2	5.6	5.1	6.4
		SD	*2.0*	*1.9*	*1.9*	*0.8*
17.	Science has carried man very far, but there are many important things that can never possibly be understood by the human mind.	M	5.0	5.1	4.5	4.0
		SD	*2.2*	*2.3*	*2.2*	*2.1*
19.	An insult to our honor should always be punished.	M	3.2	2.5	3.6	4.4
		SD	*2.0*	*1.7*	*2.2*	*1.6*
20.	It is more than just chance that Japan had an earthquake on Pearl Harbor day, December 7, 1944.	M	2.2	1.4	2.4	4.0
		SD	*1.6*	*0.6*	*1.3*	*2.1*
21.*	Society improves when young people with rebellious ideas continue to fight for social change.	M	3.4	3.2	3.4	3.4
		SD	*1.7*	*1.8*	*1.6*	*1.4*

TABLE 1 (*continued*)

Item No.**	Item		Total group (N=44)	Cluster		
				A (N=21)	B (N=14)	C (N=5)
23.	Obedience and respect for authority are the most important virtues children should learn.	M	5.5	5.3	5.1	7.0
		SD	*1.8*	*1.9*	*1.8*	*0.0*
24.*	It would only make things worse to give the Germans and Japanese a dose of their own medicine.	M	3.0	2.8	3.4	4.0
		SD	*2.1*	*2.3*	*1.9*	*2.1*
25.	Every person should have complete faith in some supernatural power whose decisions he obeys without question.	M	3.0	2.6	2.4	4.0
		SD	*2.1*	*2.0*	*1.8*	*2.2*
26.	No weakness or difficulty can hold us back if we have enough will power.	M	5.7	5.4	5.9	6.4
		SD	*1.8*	*1.9*	*1.7*	*0.8*
28.	What youth needs in these troubled times is strict discipline, rugged determination and training in self-denial.	M	3.9	4.1	2.6	5.0
		SD	*2.0*	*1.8*	*1.4*	*2.1*
29.	Most people don't realize how much our lives are controlled by plots hatched in secret by politicians.	M	4.5	5.0	3.6	4.0
		SD	*2.0*	*1.7*	*2.0*	*2.1*
31.	It is probable that wars and social troubles will be ended once and for all by an earthquake or flood that will destroy the whole world.	M	2.5	2.2	2.8	3.0
		SD	*2.2*	*2.0*	*2.2*	*2.1*
35.	The true American way of life is disappearing so fast that force may be necessary to preserve it.	M	2.8	2.5	1.9	4.2
		SD	*1.6*	*1.6*	*0.7*	*1.5*
38.	One of the greatest virtues a person can have is a great love, gratitude and respect for his parents.	M	6.4	6.3	6.2	7.0
		SD	*1.2*	*1.4*	*1.3*	*0.0*
41.	Some day it will probably be shown that astrology can explain a lot of things.	M	2.9	1.7	3.1	3.4
		SD	*2.1*	*1.8*	*1.8*	*2.0*
42.	Sex crimes deserve more than mere imprisonment; such criminals ought to be publicly whipped, or worse.	M	3.7	3.2	3.1	6.6
		SD	*2.3*	*2.2*	*2.0*	*0.5*
43.	Human nature being what it is, there will always be war and conflict.	M	5.1	4.8	5.0	6.8
		SD	*1.9*	*2.1*	*1.7*	*0.4*
44.	In order for us to do good work, it is necessary that our bosses outline carefully what is to be done and exactly how to go about it.	M	4.2	4.2	3.3	5.4
		SD	*2.1*	*2.2*	*1.9*	*1.7*

TABLE 1 (*continued*)

Item No.**	Item		Total group (N=44)	Cluster A (N=21)	Cluster B (N=14)	Cluster C (N=5)
45.	Familiarity breeds contempt.	M	3.0	2.0	3.1	5.4
		SD	*1.5*	*1.0*	*1.3*	*0.5*
PEC Scale Items						
4.*	When big business interferes with general welfare, it should be controlled.	M	1.5	1.3	1.8	1.6
		SD	*0.6*	*0.5*	*0.8*	*0.5*
9.	America may not be perfect, but the American Way has brought us about as close as human beings can get to a perfect society.	M	5.6	5.3	5.6	6.0
		SD	*1.7*	*1.9*	*1.7*	*0.6*
10.*	The artist and the professor are of just as much value to society as the business man and the manufacturer.	M	1.3	1.2	1.4	1.4
		SD	*0.7*	*0.8*	*0.5*	*0.5*
11.*	Labor unions should become stronger and have more influence generally.	M	5.3	5.0	5.7	6.0
		SD	*1.7*	*1.9*	*1.2*	*0.6*
13.*	High taxation on wealthy individuals to help the poor is better than private charity.	M	3.8	3.3	4.3	3.0
		SD	*1.9*	*2.0*	*1.5*	*2.1*
16.	Men like Henry Ford or J. P. Morgan, who overcome all competition on the road to success, are models for all young people to admire and imitate.	M	4.4	4.6	4.3	4.6
		SD	*2.0*	*2.1*	*2.0*	*1.4*
27.*	It is up to the government to make sure that everyone has a secure job and a good standard of living.	M	4.2	3.4	5.6	3.6
		SD	*2.1*	*2.0*	*1.4*	*2.1*
32.*	Most government controls over business should continue after the war.	M	4.5	4.5	5.4	3.8
		SD	*2.0*	*1.9*	*1.8*	*2.3*
33.*	Depressions can be prevented by proper government planning.	M	2.2	2.0	2.9	1.4
		SD	*1.6*	*1.7*	*1.6*	*0.5*
34.	The best political candidate to vote for is the one whose greatest interest is in fighting vice and graft.	M	4.7	4.7	4.5	5.4
		SD	*1.7*	*1.8*	*1.7*	*0.5*
37.*	It is dangerous for the United States not to coöperate closely with Russia.	M	4.2	4.6	3.9	3.6
		SD	*2.0*	*2.2*	*1.7*	*1.6*

quired of the respondent. Furthermore, since we will not attempt to draw any conclusions regarding differences on specific items, our decision to eschew inferential statistical techniques seems justifiable, especially in light of the small size of the clusters. As will become apparent in the following presentation, our approach in the present study is essentially hypothesis-seeking rather than hypothesis-testing. Its heuristic worth thus will be determinable from its success in generating hypotheses concerning the nature of attitude organization and its correlates.

1. *E Scale*

Only one item, *E 22* (Zootsuiters cause trouble), fails to separate clusters. Also, its Total Group variability was lowest of all *E* items which, taken with the mean response of 5.5, indicates virtual unanimity of opinion among these adolescents in disapproving deviant members of their own age group.

Table 2 facilitates consideration of intercluster differences on the 10 discriminating *E* scale items. Cluster *A* is strikingly consistent in being least prejudiced. On all discriminating items this cluster occupies the least prejudiced position and, in absolute level of mean response, always disagrees with ethnocentric statements and agrees with unprejudiced ones. Cluster *B* occupies a middle ground with respect to both relative position and absolute level: on eight items it occupies the middle position with respect to the other clusters; in seven instances, it falls in the three to five range of level of agreement. Cluster *B*'s high absolute and relative agreement on *E 1* suggests that personal contact with minority groups is rejected. Following through on this we find a tendency for Cluster *B* to be more prejudiced, relatively and/or absolutely, on those items which involve social intimacy with minority group members in contrast with items dealing with tolerance in personally more remote situations. The only apparent exception to this generalization is found on *E 6*. At the time these data were gathered, however, the Japanese had returned to California so that the interpretation of this item in the present study is uncertain.

Cluster *C* reflects the consistency of its ethnocentrism by occupying the most prejudiced position for eight of the 10 statements. For nine items Cluster *C*'s absolute level fell in the prejudiced half of the seven-point scale. The single exception (*E 18*) may be a double-barreled item; rather than being seen as prejudicial to Negroes, it may instead be interpreted as making the "poor" responsible for their own misfortune. Lastly, ethnocentrism in

TABLE 2

INTERCLUSTER DISCRIMINATION ON *E*-SCALE ITEMS

(Item means for each cluster are recorded on a continuous seven-point scale. Only items differing at least 1.0 between any two clusters are presented.)

Item			Disagree			Agree		
No.	Item	1	2	3	4	5	6	7
1	(Segregate Negroes*)			A		C	B	
6	(Allow Japanese to return)				C		B A	
14	(Mistake to have Negro foreman)			A	B			C
15	(Jews pretty much alike)			A	B		C	
18	(Negroes poor because lazy)			A C	B			
30	(Send "Okies" home)			A	B	C		
36	(Foreign ideas dangerous)			A	B	C		
39	(Jews change neighborhood)		A		BC			
40	(Would marry Jew)		C B		A			
46	(Jews unfair in business)			A	B	C		

*Refer to Table 1 for complete text of items and actual item means. For items asterisked in Table 1, subtract item mean from 8.0 to obtain item value for this table. This procedure results in the same scale orientation for all items in the present table.

Cluster *C* seems more generalized in that no relationship exists between closeness of contact and degree of prejudice.

2. *F Scale*

Nineteen of the 24 *F* Scale items differentiate clusters. Of the five remaining items, three (*F 2, 21, 38*) may have special significance for adolescents with a resultant conformity of opinion and failure to differentiate clusters. For example, *F 38* (Love for parents greatest virtue), shows far less variance than any other *F* item and wins by far the greatest agreement from the group.

In order to facilitate discussion, the 19 differentiating items were categorized into four content groups: projection, conformity, power, and superstition. These groupings are *a priori*, being modifications of similar groupings employed in *The Authoritarian Personality*. The statements assigned to each group can be found in Table 3; the following discussion is based on the data contained therein.

a. Projection. The statements assigned to this group are assumed to reflect a tendency to externalize unacceptable impulses or to evade responsibility for them by cynically or fatalistically attributing them to nature, human or physical. Cluster *A* is generally not extreme on these statements. There is a hint of less general cynicism about human nature (*F 45*) and of a tendency toward a more impersonal form of projection (*F 8, 29*). Cluster *B* has the least tendency to project. Both on relative position and absolute level this cluster is lowest on four of the six items. In general, an impunitive and optimistic view is expressed by these boys. Cluster *C*, on the contrary, sees the world as dangerous (*F 8, 43*), immoral (*F 3*), and fickle (*F 45*) with a consequent need for harsh control and punishment (*F 42*). The sole exception to this view, which exempts "politicians" (*F 29*), is, as we suggest later, suggestive of a dependence upon government.

b. Conformity. These statements are generally approved by all clusters which, again, may reflect to the predominantly middle class composition of our sample. Cluster *A* shows no deviant responses; Cluster *B* does deviate by espousing autonomy (*F 44*). Cluster *C* presents a curious paradox; while it is clearly most conventional on three of the items, it is much less quick to condemn persons of "bad manners, habits, and breeding" (*F 5*). We suspect that the inclusion of "breeding" may be responsible for this apparent exception to their extreme conventionality, a point to be elaborated later.

c. Power. These statements refer to the belief that forceful action

TABLE 3
INTERCLUSTER DISCRIMINATION ON *F*-SCALE ITEMS

(Item means for each cluster are recorded on a continuous seven-point scale. Only items differing at least 1.0 between any two clusters are presented.)

Item			Disagree			Agree		
No.	Item	1	2	3	4	5	6	7
Projection								
3	(Wild sex life in high places*)			B		A	C	
8	(Danger of infection & disease)					B A	C	
29	(Politicians control our lives)				B C	A		
42	(Whip sex criminals)			BA				C
43	(War & conflict inevitable)					A B		C
45	(Familiarity breeds contempt)		A	B			C	
Conformity								
5	(Bad manners unacceptable)				C		A B	
12	(Decent people never hurt relatives)					B A		C
23	(Virtuous to respect authority)					B A		C
44	(Necessary that boss outline work)			B	A	C		
Power								
19	(Punish all insults to our honor)			A	B	C		
24	(Vengeance anti-German, Japs unwise)				C	B A		
26	(Will power overcomes all difficulties)						A B	C
28	(Youth needs strict discipline)			B	A	C		
35	(Preserve American way by force)		B	A	C			
Superstition								
17	(Some things always beyond Science)				C	B A		
20	(Jap earthquake not accidental)		A	B	C			
25	(Unquestioning faith in supernatural)			B A	C			
41	(Astrology can explain much)		A	B C				

*Refer to Table 1 for complete text of items and actual item means. For items asterisked in Table 1, subtract item mean from 8.0 to obtain item value for this table. This procedure results in the same scale orientation for all items in the present table.

(discipline, determination, and retaliation) best serve to protect and preserve the individual and the nation. Cluster *A* eschews force (*F 19, 24, 35*) and seems uncertain of the efficacy of will power and discipline (*F 26, 28*). Cluster *B* is indifferent to issues of national honor (*F 19, 24*) and violently rejects the imposition of external force (*F 28, 35*). Cluster *C* consistently exhibits a relatively greater endorsement of this "power" orientation.

d. Superstition. This group of items defines a disbelief in the rationality of man and nature, with an accompanying acceptance of supernatural influence. Cluster *A* vigorously endorses rationality on three of the items, but reverses position on the fourth (*F 17*). Cluster *B*, while exhibiting a similar pattern is clearly more "superstitious" on *F 20* and *41*. For these two clusters it appears that *F 17* taps another dimension than the other three items. It may refer to a more comprehensive religious ideology which cannot properly be subsumed under "superstition." Cluster *C* is clearly most "superstitious." However, the absolute levels are all near the neutral point. Neutrality on these items, ones which might be expected to pull extreme responses, *pro* or *con*, suggests that Cluster *C* may actually be indifferent to these issues.

The failure of the three clusters to maintain the same relative positions over all the items, or even over these four subgroupings, supports Christie's (2) conclusion that a single dimension is insufficient to account for response to the *F* scale.

3. *PEC Scale*

Six of the 11 items in this scale are differentiating. Two of the remaining items (*PEC 4, 9*) probably do not measure political-economic conservatism in an adolescent group so that the apparent contradiction posed by the uniformly high endorsement of both statements may be resolved if instead both these items are regarded as referring to a patriotic acceptance of our government and its actions. We attribute the uniformly high endorsement of *PEC 10* to the fact that our respondents had prolonged and personal contact with university staff members. The discriminating items are presented in Table 4.

Four of the items (*PEC 13, 27, 32, 33*) may all be considered as endorsing "welfare state" measures. On these, Clusters *A* and *C* are very similar in their general approval. Cluster *B*, on the other hand, is always less favorable towards these items, either actively disagreeing or at best remaining neutral. Little can be said of the remaining two items (*PEC 11, 37*) other than that, intuitively, they appear to involve specific factors, an impression which is also gained from the unique orderings of the clusters on these items.

TABLE 4

INTERCLUSTER DISCRIMINATION OF *PEC* SCALE ITEMS

(Item means for each cluster are recorded on a continuous seven-point scale. Only items differing at least 1.0 between any two clusters are presented.)

Item			Disagree			Agree		
No.	Item	1	2	3	4	5	6	7
11	(More power for labor unions*)		C B	A				
13	(Tax rich to help the poor)				B	A C		
27	(Gov't insure economic security)		B		C	A		
32	(Continue Gov't controls)			B	A C			
33	(Gov't can prevent depressions)					B	A	C
37	(U. S.-Russia non-coöperation risky)			A	B C			

*Refer to Table 1 for complete text of items and actual item means. For items asterisked in Table 1, subtract item mean from 8.0 to obtain item value for this table. This procedure results in the same scale orientation for all items in the present table.

F. CHARACTERIZATIONS OF CLUSTERS

The usefulness of clustering people by specific item responses hinges upon the psychological congruence of the pattern of salient items as described above. If the pattern of phenotypically diverse specific attitudes exhibited by a given cluster can be shown to be psychologically compatible through the postulation of some attitudinal genotype, then the cluster has at least face validity. The following composite descriptions are based entirely upon the foregoing analysis of discriminating items to which the reader is referred for documentation of any of the following generalizations. Some attempt to test the actual validity of these inferred "types" will be explored in a later section.

1. *Cluster A*

Cluster *A* appears to be very unprejudiced, impunitive, and idealistic. Parenthetically, we may note that the hypothetical "good impression" boy fell in this cluster. They exhibit a generally gentle attitude towards people as indicated by a rejection of force as a control device and an endorsement of "welfare state" proposals. The existence of such a consistent and thoroughgoing acceptance of all groups by these adolescents suggests a very idealistic, and perhaps even pollyannish, perception of the world. The view of the government as a benevolent "father-figure" supports this sketch of an essentially trusting and optimistic approach to others. We would suspect that such an attitude syndrome could hardly have derived from actual relevant experiences with a broad range of people and situations. Rather, it may be that these boys, through their positive identification with their parents, have caricaturized the latters' possibly more mature "liberalism." This would be in line with Helfant's (4) finding that adolescents tend to adopt a more extreme position than their parents on certain socio-political attitudes. The inferred "liberalism" of these parents and our observations about the boys themselves lead to the hypothesis that the parents of Cluster *A* are above average in education, tend to be drawn from the professional ranks, and may regard themselves as "intellectuals."

2. *Cluster B*

These boys differ in several respects from those in Cluster *A*: their attitudes towards minority groups are more "practical" and "realistic"; they are clearly more "conservative" in their perception of the governmental function, tending to exhibit a kind of "rugged individualism." This latter characterization is supported by their strong insistence on personal autonomy This hypothesis of greater realism is consistent with Cluster *B*'s relative lack of inferred projection of unacceptable impulses. The resemblance of this attitude configuration to the "business man" stereotype again suggests that we focus upon parental attitudes rather than upon the boys' attitude-relevant personal experiences since it seems unlikely as a personally evolved social philosophy. This, in turn, leads us to hypothesize that Cluster *B* parents tend to hold to the "business man" outlook, being either actual members of that group or actively identified with it. They should differ from Cluster *A* parents perhaps most strikingly in being less "intellectual." This would be consistent with the relatively greater "superstition" earlier noted for Cluster *B* boys.

3. *Cluster C*

Cluster *C* is clearly the most deviant group both with respect to absolute levels and relative positions on most of the items. In very many respects they appear to resemble the "high" of *The Authoritarian Personality* (e.g., extreme prejudice, projection, conformity, power orientation). Yet they radically depart from the classic pattern in their distinctly "liberal" attitude toward "welfare state" items. This apparent contradiction can be resolved by hypothesizing that the families of this cluster have some personal stake in governmental guarantees of economic security. This, coupled with our earlier observation of Cluster *C*'s tendency to absolve "poor" persons and those of "bad breeding," leads to the speculation that Cluster *C* is on a lower socio-economic level than either of the other clusters. This would be in line with the negative correlation between acceptance of *F*-scale items and educational level, as discussed by Christie (2, 167-182).

As is apparent from the above sketches, we have tended to attribute the organization of the attitudes of the three clusters to socio-economic factors in the respondents' backgrounds. This assignment of the organizing rôle in adolescent social attitudes to socio-economic factors did not spring from the writers' theoretical predilections but seemed to us to provide the most parsimonious and immediately apparent basis for understanding these attitude configurations. However, these data have suggested a theoretical hypothesis. Briefly put, we propose that adolescent social attitudes may involve a characteristic mediation process differing from that usually proposed for adult attitude formation. In the latter case, social attitudes are seen as rather directly dependent upon, and expressive of intrapersonal factors and involving, especially in the case of attitudes toward minority groups, the attribution of personal, symbolic rôles and meanings to the attitudinal referents. We suspect that the referents of our particular set of items (e.g., Negroes, government, big business) are too distant and impersonal to serve as targets for such processes as projection, identification, etc., for adolescents. Not only is it implausible that their lives should yet have involved much direct and relevant experience with these social objects but it is even unlikely that adolescents have yet absorbed the cultural definitions of such groups and institutions which is a necessary condition for establishing them as phenomenologically important cultural entities. Thus, it seems possible that adolescent social attitudes, rather than representing a selection from the socially available repertoire of attitudes in the service of a complex of personal needs, instead are an expression of a single broad desire to conform with and belong to one's particular subculture. If this is so, then we could expect an adolescent's social attitudes to resemble his perception of the "average" approved attitude of his adult environment, particularly as exemplified by his parents. We could, in this event, expect his attitudes to be relatable to the major correlates of such "average" subcultural attitudes among which socio-economic parameters may perhaps be most important. To the extent that these suggestions regarding adolescent attitude formation are valid, the clusters should show socio-economic differentials.

Examination of several socio-economic indices available for our subjects throws some light on the reasonableness of our hypothesis of differences in social background. Midparent education (the average number of years of schooling of the parents), for example, is very similar for Clusters *A* (13.8) and *B* (14.8) but only 11.8 years for Cluster *C*. With respect to Warner's Occupational Level rating (10), none of the Cluster *C* fathers fall into the top two levels while 60 per cent of the Cluster *A* fathers and 54 per cent of Cluster *B* fathers fall into these two occupational groupings. The occupational level means for *A*, *B*, and *C* are 2.4, 2.7, and 3.4 (the lower the mean, the higher the level). Using an over-all rating of socio-economic level (Warner's Index of Status Characteristics, which includes the above occupational level rating together with ratings of house type, dwelling area, and source of income), we find a median *T*-score of 44.5 for Cluster *C* families, 52.0 for Cluster *A*, and 58.5 for Cluster *B*. The over-all higher status of Cluster *B*, as compared to Cluster *A*, especially in the context of its somewhat lower occupational level, implies that Cluster *B* families are either financially more successful or, perhaps, manifest their superior financial status more materially. In either event, this status difference between Clusters *A* and *B* is in the direction which our speculations would have led us to expect. Also, our hypothesis concerning Cluster *C* has tentative support. These measures, of course, provide only the most indirect tests of our general hypothesis. More direct measures of parental attitudes and the family social philosophy would be required for any serious evaluation of our suggestion concerning a "conformity" determination of adolescent social attitudes. Even if such indices were available to use, the size of our clusters would discourage any more ambitious attempt at hypothesis testing on the present sample.

G. Conclusion

Our suggestion that adolescent social attitudes are in part determined by an adoption of parental attitudes which, in turn, reflects the family socio-economic or subcultural group social outlook is certainly not a new one. Instead it is "retrogressive" in that it represents a restatement of the point of view which current research on the intrapersonal determinants of attitudes explicitly attempts to counter. There can be no question as to the validity or importance of recent findings, particularly in the area of anti-minority prejudices, which demonstrates such statistically and psychologically convincing linkages as, for example, the influence of parental child-rearing attitudes and practices upon adult personality structure and, in turn, upon the formation of social attitudes. However, as is often the case when research endeavors to sharpen the understanding of a particular phenomenon by attending to a hitherto neglected source of determination, the impetus of the argument leads to an undervaluation, and even denial, of the importance of the factors which had previously been overemphasized. The resultant formulation may thus be equally lacking in perspective. This over-swing of the pendulum also tends to be translated into methodological designs which now exaggerate the "new" factors and mask the "old."

With respect to the present problem, there are at least two such methodological practices characteristic of much current research: the use of extreme groups on the attitudinal dimension and of socio-economically homogeneous samples. Both practices are of course legitimate and desirable in the interests of a more powerful methodology: when we wish to investigate the rôle of personality factors in attitude formation it is to our advantage to "control" for the effects of the now "irrelevant" socio-economic factors which are known to relate to attitudes. This "control" may be instituted accidentally, but nonetheless effectively, when we sample from a convenient college population, or it may be intentional, as in the case of the interview sample in *The Authoritarian Personality*, where the "highs" and "lows" were roughly matched on political and religious affiliation and national or regional background although the total sample already had an admittedly restricted range along socio-economic dimensions. When, purposefully or otherwise, the range of talent of a class of variables is attenuated, inference as to the importance

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of these "controlled" variables is necessarily precluded. Furthermore, when relationships between personality and attitudes are demonstrated for extreme samples, generalization to the middle attitude range is hazardous, if not misleading.

What we believe we have shown is that, in a group of more than usual socio-economic heterogeneity in which we have retained the full range of attitudes, differential attitude patterning seems most readily relatable to socio-economic differences. This finding cannot be opposed to the findings stressing intrapersonal determinants; the populations to which the different results refer are themselves different. Rather, we can integrate these results into the more general hypothesis that, while "middle-range" social attitudes are largely the product of one's immediate social environment, the holding of extreme attitudes may be primarily an intrapersonal phenomenon. Such a formulation would be compatible with the frequent observation that more deviant attitudes seem to be held more intensely, are accompanied by greater emotional investment, and are more resistant to social modification.

We do not claim, nor indeed would we expect, that the particular attitudinal configurations found in our sample are generalizable to an adult population or even to another adolescent group drawn from a different social-cultural milieu. These patterns of social attitude organization are in no sense to be regarded as anything more than a description of characteristic patterns of response to a particular sampling of attitude items exhibited by a particular group of adolescents situated in a specific cultural and temporal setting. We need hardly point out that our characterization of the clusters and our informal attempts to delineate their determinants make no pretense to statistical testing of explicit hypotheses. We have, as promised, only undertaken to define and illustrate a conceptual framework and an appropriate analytic approach to the study of social attitudes. These have proven capable of utilizing information which is necessarily excluded when we permit a single composite score (or a few scale scores) to be used to summarize the individual item response pattern. This additional information provided by the item pattern in the present study seems to have led to the detection of determinants inaccessible to an analysis which ignored the fact of different systematic patternings of these social attitudes and, instead, invalidly assumed a homogeneity or randomness of patterning.

H. SUMMARY

The conviction underlying this research was that a consideration of individual item patterning would contribute information concerning the organization and determination of social attitudes which is not accessible when com-

posite scale scores are employed to summarize item responses. The social attitude data were the responses of 43 adolescent boys to a 46-item social attitude questionnaire composed of *E*, *F*, and *PEC* items. The item patterns were intercorrelated and an inverse (person) cluster analysis was performed on the resultant correlation matrix.

Three clusters of 21, 14, and 5 persons were found, with four boys failing to meet the criteria for inclusion in any of the clusters. These clusters are described and contrasted in terms of their characteristic responses to individual items and a description of the composite social attitude configuration is presented for each. Examination of these descriptions led to the hypothesis that, for this adolescent group, social attitudes are less expressive of deep-lying personality factors than they are of the boys' individual subcultural milieus. The presence of differences among these three clusters on certain socio-economic indices lend support to this tentative hypothesis. These results, aside from their possible relevance to specific theoretical issues, are primarily taken as exemplifying the advantages of dealing with item patterns rather than scale scores in the study of social attitudes.

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THE RELATION BETWEEN EXPRESSED SELF-ACCEPTANCE AND EXPRESSED ATTITUDES TOWARD NEGROES AND WHITES AMONG NEGRO CHILDREN*

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A. INTRODUCTION

Psychologists and educators (2, 4, 5, 6, 8) are today focusing considerable attention on the study of the self-concept. That acceptance of self is positively related to acceptance of others is one of the major hypotheses developed in this area. Evidence supporting this hypothesis has been reported by several investigators (1, 8, 9, 10). Each of these investigators, however, utilized white children or adults as subjects. The purpose of this study was to investigate this relationship among Negro children. The specific hypothesis of this inquiry was that self-accepting Negro children would tend to express more positive attitudes both toward Negroes and whites than would Negro children who were less self-accepting.

B. THE PROCEDURES

The subjects of this study were 202 Negro children and youth, 112 males and 90 females, selected from three public schools in the boroughs of Manhattan and Brooklyn in New York City. Subjects ranged in age from nine to 18 years with the median age at 13.4 years. Each subject was given a battery of four instruments by the investigator. These instruments included: (*a*) a personal data sheet of questions pertaining to the subject's age, grade in school, family background, personal interests and future plans; (*b*) a checklist of statements dealing with social conformity; (*c*) a sentence completion test consisting of a series of incomplete statements designed to tap the self-feelings and self-attitudes of subjects; and (*d*) an Attitude-Finder. All tests were secretly coded so that subjects were not required to write their names.

An Attitude-Finder was used to measure the attitude of subjects toward

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Negroes and whites. This instrument was developed in a series of successive steps through several complete revisions. The final instrument consisted of 52 items divided into two subscales for measuring attitudes towards whites and Negroes. The attitude items were organized according to Kramer's (7) three dimensions of prejudice: cognitive, emotional, and action. The cognitive items measured the way in which the subject saw the group, that is, as a threat, as inferior, as impulse-gratifying, as characterized by negative behavior, etc. The emotional items referred to the feelings elicited in the subject, such as trust, contempt, anger, etc. The action items were designed to probe the subject's attitude toward specific actions involving whites and Negroes, such as rejection in social relations, aggression, inclusion or exclusion, etc.

Responses to the Attitude-Finder were converted into scores so that the higher the score, the more negative the attitude. The internal consistency of the scale was evaluated by the item-discrimination technique. The total scale reliability of the Attitude-Finder was .82 and was determined by correlating scores obtained on the odd numbered items with those obtained on the even numbered items and correcting the coefficient of correlation with the Spearman-Brown formula. The correlation between the two subscales was .12. A detailed treatment of the reliability and validity of the Attitude-Finder is included in the original report (11).

Self-acceptance was measured by a sentence completion test originally devised by Cruickshank (3). According to Cruickshank, the 45 sentences of this test were ". . . geared to evaluate the self-concepts of adolescent children in several areas of life adjustment" (3, p. 294). The 202 sentence completion protocols were given to three judges. Two of the judges were clinical psychologists and one was a psychiatric social worker. Each had had extensive training in the field of personality and experience in counseling Negro children or adults.

The judges were asked to classify the sentence completion protocols into three groups: the most self-accepting, the least self-accepting, and the ambivalent. Ten criteria of self-acceptance were used by judges as standards for classifying protocols. These 10 criteria were based upon criteria proposed by Scheerer (9) and Berger (1). Examples of these criteria are: the self-accepting child does not consider himself as queer or totally different from other people; the self-accepting youngster does not doubt his worth as a person; etc.

The reliability of the sentence completion test was estimated in two ways. The first was an analysis of the agreement among judges. The number of agreements found among the three judges was compared to the number of agreements expected by chance. These data, shown in Table 1, yielded a Chi-square sum of 679 which was significant at the .01 level.

A second measure of reliability of the sentence completion test was obtained from the performance of 20 subjects who were retested after one month. These tests were classified by the judges along with the original protocols. The judges were not informed that there were any retests among the protocols. Two of the three judges made identical appraisals of the two protocols of each of the 20 subjects; the third judge made identical appraisals of the two protocols of each of 19 subjects but classified the first protocol of one subject in the most accepting group and the second protocol of the same subject in the ambivalent group. In other words, with 60 opportunities for a shift in classification, only one such shift was found.

While it was not possible to obtain validity coefficients for the Attitude-Finder and the sentence completion test, due to a lack of external criteria, it appeared desirable to discover whether the attitudes and feelings expressed by subjects in one situation were psychologically consistent with the attitudes and feelings expressed in other situations. To throw light on the psychological meaningfulness of the sentence completion test and the Attitude-Finder, four subjects were given depth interviews and were studied in detail over a period of time. The evidence obtained from examination of these four cases tended to support the belief that the sentence completion test and the Attitude-Finder were valid instruments (11, pp. 78-105).

C. Results

The first step in anlyzing differences among the means of the three self-groups was to analyze differences in variation. The variances of the three self-groups were analyzed by the *F*-Test. If there were no significant differences between variances, the *t*-test (which has Student's distribution) was applied.

Table 2 shows the means and variances of the three self-groups on the two subscales. There was a continuous increase in the mean scores from the *most* to the *least* self-accepting groups in both *subscale* scores. The smallest variation on both subscales occurred within the *most* self-accepting group. The greatest subscale variation occurred within the *ambivalent* group on the Negro subscale and within the *least* self-accepting group on the white subscale.

The two subscale variances of the *most* self-accepting group were compared with the subscale variances of the *ambivalent* and of the *least* self-

TABLE 1

THE CLASSIFICATION OF ALL POSSIBLE ARRANGEMENTS, OF THE SENTENCE COMPLETION PROTOCOLS, BY THE THREE JUDGES, ACCORDING TO THE EXTENT OF AGREEMENT AND THE PROBABILITY OF A GIVEN AGREEMENT BY CHANCE AND THE ACTUAL ARRANGEMENTS MADE BY THREE JUDGES

Agreement	Possible arrangements showing given agreement	Number of arrangements in groups	Probability of a given arrangement by chance	Actual arrange-ment	Number of protocols	Protocols in agreement groups No.	%	Per cent expected by chance
Complete	MMM,AAA,LLL[a]	3	$3/27 = .111$	MMM	21	137	68%	11.1%
				AAA	87			
				LLL	29			
Partial	MMA,MML,MLL	18	$18/27 = .667$	AMA	3	62	31%	66.7%
	MAM,MLM,AAM			MAA	10			
	ALL,AMA,ALA			AAM	8			
	LLM,LLA,LMM			AAL	3			
	LML,LAL,LAA			LAL	6			
	AAL,AMM,MAA			ALL	4			
				LAA	8			
				ALA	15			
				MMA	1			
				LLA	1			
				MAM	3			
None	MAL,MLA,AML	6	$6/27 = .222$	MAL	2	3	1%	22.2%
	ALM,LAM,LMA			ALM	1			

[a] The letters *M*, *A*, and *L* denote most self-accepting, ambivalent, and least self-accepting respectively.

accepting groups and no significant differences in variation were found; it may be assumed therefore that these three populations have the same variance.

Table 3 depicts the analyses of the mean differences on the white and Negro subscales for the three self-groups. The results of these six comparisons appear to confirm the hypothesis posed. The *most* self-accepting group expressed significantly more positive attitudes toward both Negroes and whites than the *least* self-accepting. On the Negro subscale a *"t"* of 3.90 was found; on the white subscale, *"t"* was equal to 3.02. Both of these mean differences were significant at the .01 level of probability; a *"t"* of 2.58 was significant at the .01 level of probability.

TABLE 2

SUBSCALE MEANS AND VARIANCES OF THE THREE SELF-ACCEPTING GROUPS

Self-group	No.	Negro subscale Mean	Negro subscale Variance	White subscale Mean	White subscale Variance
Most self-accepting	25	46.66	40.94	41.52	85.13
Ambivalent	134	49.01	72.56	44.27	88.12
Least self-accepting	40	52.57	67.03	46.05	91.05

TABLE 3

SIX TESTS OF SIGNIFICANCE OF MEAN DIFFERENCES BETWEEN THE THREE SELF-GROUPS ON THE NEGRO AND WHITE SUBSCALES

Subscale	Groups compared	Difference in means	t	t .95	t .99
Negro	M-L*	—5.89**	3.90	1.96	2.58
Negro	M-A	—2.35	.99	1.96	2.58
Negro	A-L	—3.56	9.25	1.96	2.58
White	M-L	—4.53	3.02	1.96	2.58
White	M-A	—2.75	.87	1.96	2.58
White	A-L	—1.78	3.72	1.96	2.58

*The symbols M, A, and L refer to the most self-accepting, the ambivalent and the least self-accepting groups.

**The subscale mean differences are all minus because the subscale means of most self-accepting and ambivalent groups were smaller than the subscale means of the least self-accepting group.

The *ambivalent* self-group expressed significantly more positive attitudes toward both Negroes and whites than did the *least* self-accepting group. The values of *"t"* were 9.25 for the Negro subscale and 3.72 for the white subscale; a *"t"* of 2.58 was significant at the .01 level of probability.

There were no significant differences between the *most* self-accepting and the *ambivalent* in attitudes toward Negroes and whites.

D. Discussion

For evaluating the results cited above, it should be noted that expressed self-acceptance was measured by the sentence completion method. One limitation of this technique is that the data include only those materials which a subject is willing and able to report. One uses such a device on the assumption that the responses given by a subject reflect the subject's own feelings, attitudes, ideas, and desires. The results of this study should be interpreted in light of this limitation.

Although the data of this study do not indicate whether perception of self determines perception of others or whether the reverse holds, clinical experience indicates that a child develops an awareness of "I" before an awareness of "we" or "they." Accordingly, we may interpret these data as suggesting that if a child does not accept himself as a person of worth and value, he may tend to perceive groups, including his own, in a derogatory and hostile fashion. It would be of interest and value to design an experiment to probe for causality in the self-other relationship. In any event, the data presented here show that the self-accepting child gives a positive appraisal of his own and other groups.

If we accept the assumption that perception of self precedes perception of others then the major implication of this study is that if we want to change the attitudes of the "prejudiced," we must help such persons to accept themselves. In the case of the Negro, it should be recognized that pressures, unfairness, and hostility from the general community may make it more difficult for him to evaluate himself and others in a healthy fashion.

E. Summary

This inquiry investigated the relationship among Negro children between expressed self-accepted and expressed attitudes toward both Negroes and whites. A checklist was used to estimate the attitudes of 202 Negro children. A sentence completion test was utilized to estimate the degree of self-acceptance. The major conclusions of this study may be stated as follows:

1. Children who were *most* self-accepting expressed significantly more positive attitudes toward both Negroes and whites than did children who were *least* self-accepting.

2. Children who were *ambivalent* in self-acceptance expressed significantly more positive attitudes toward both Negroes and whites than children who were *least* self-accepting.

3. There were no significant differences between the *ambivalent* and the *most* self-accepting in attitudes toward both Negroes and whites.

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NOTES ON THE CRITERION PROBLEM IN RESEARCH, WITH SPECIAL REFERENCE TO THE STUDY OF TEACHER CHARACTERISTICS*[1]

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A. INTRODUCTION

These notes dealing with considerations of the criterion in research design are an outgrowth of questions and problems with which the staff of the Teacher Characteristics Study was confronted both in the planning stages and throughout a six-year program of research aimed at the identification, estimation, and comparison of characteristics of teachers. Some of the questions have been recognized in a previous Teacher Characteristics Study report, "Research Designs for the Empirical Validation of Tests and Inventories," (14) and investigations pertaining to related problems have been discussed in more specific contexts in References 11, 12, 13, 15, 16, 17, and 20, and in additional Teacher Characteristics Study reports still in preparation.[2]

The present paper takes cognizance of such questions, basic to the pursuance of the Teacher Characteristics Study, as the following:

1. How shall judgments and decisions be arrived at, in as rational and objective a manner as possible, regarding the nature and designation of criteria? Specifically, in the development of procedures for the identification and estimation of teacher characteristics, what means shall be employed in determining the important behavior domains (criteria) that such estimating devices should predict?

2. Having designated certain criteria, how shall the constitution of a particular criterion be determined? What behavior dimensions make up the criterion?

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[1] The Teacher Characteristics Study is a research project of the American Council on Education and The Grant Foundation, conducted from the University of California, Los Angeles.

[2] The nature of various kinds of criterion data employable in the investigation of *teacher effectiveness*, and certain difficulties and control problems associated with the use of such criteria, have been critically reviewed by the A.E.R.A. Committee on Criteria of Teacher Effectiveness (1, 2), Morsh and Wilder (7), Rabinowitz and Travers (9), and the writer (18; 19, pp. 373-379, 384-387).

3. How are the constituent dimensions of a criterion interrelated? How are the criterion variables patterned? What should be the relative importance or weight assigned each constituent in a combination or pattern?
4. How generalizable are the patterns of criterion dimensions?
5. How shall measures of the criterion behavior be obtained? What different approaches to the measurement of criterion data may be employed?

Consideration was given each of these questions by the Teacher Characteristics Study with attention to its application to the investigation of teacher classroom behaviors and related teacher characteristics.

B. The Criterion Problem in Behavioral Research[3]

1. *Nature of a Criterion*

Generally speaking, a criterion is a standard or rule used to provide a frame of reference for judging or testing something. It is a *base,* often of a rather arbitrary nature and ultimately involving value judgments, against which comparisons may be made.

The criterion problem exists and demands consideration in every research undertaking. In comparisons employing index numbers, the criterion is the base year or base group. In research dealing with school buildings, course content, and a variety of educational and social problems, the criteria often have been (though other bases may be, and occasionally have been, brought into the picture) arbitrary standards derived from presumed expert opinion. In experimental research, the criterion is the behavior constituting the dependent variable. In prediction research, it is the behavior the researcher attempts to predict and against which the relevance and usefulness of his predictors may be judged.

A criterion frequently is complex, consisting of a number of facets (which in both research and practice sometimes are overlooked, and, on the other hand, also sometimes assigned undeserved importance). Usually the complexity of a criterion is in direct proportion to the breadth of the behavior with which the researcher is concerned. If the criterion behavior is readily defined, and is uninvolved, determination of its salient features and derivation of suitable criterion measures may be no great problem. Job sample performance tests may be fairly easily developed for tasks requiring a restricted set of operations. Even in dealing with behavior that is relatively complex, but where the end-product is readily discernible, criterion measures may be fairly easily agreed upon. Thus, however varied and numerous the activities of the insurance salesman, or the baseball player, policy sales, on the one hand, and hits, runs, errors, and the like for the baseball player, provide both convenient and apparently valid criterion data. But determination of the criterion behavior of the physician, the lawyer, the clergyman, or the teacher may be quite a different matter. In such cases we seldom attempt use of the singular, *criterion,* but often correctly assume the plural, *criteria,* recognizing from the outset the complexity of the criterion behavior. Research in the area of teacher effectiveness has been notably sterile due, in no small part, to difficulties inherent in adequately defining and obtaining criterion measures of teacher competence (19).

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[3] References 4, 5, 6, 8, 21, and 22 deal with general aspects of the criterion problem.

2. *Arm-chair, Rational, and Empirical Approaches to the Criterion Problem*

In spite of the importance of the criterion problem, it frequently has been neglected, or at best treated in a common-sense manner with little apparent attention to ever-lurking biasing conditions. In such a way, thousands of criteria for teacher effectiveness, school housing, textbooks, teacher load, salary schedules, vocational success, and the like have been arbitrarily set up and employed by professional educators. Typically, such criteria are based on an *arm-chair* approach to the criterion.

The so-called *arm-chair approach* is highly subject to intentional and unintentional selection, or bias, in that it utilizes unanalyzed retrospective impressions, based upon non-systematic observation and often characterized by free-association, and therefore is likely to result in incomplete and contaminated descriptions of criteria. Also, as Brogden and Taylor warn, many unsophisticated (arm-chair) concepts of criteria take their descriptions from readily available (and what may appear to be "obvious") criterion *measures:* "From reports of validation studies found in the literature, it may be judged that the usual first step in criterion development is the search for *available* criterion measures. . . . The discovery of several already available or readily obtained measures that are *apparently* suitable is inclined to lead to neglect of the systematic observation and analysis necessary to insure that all important aspects of on-the-job productivity have been identified" (5, p. 162).

Although value judgments inevitably are involved in dealing with criterion problems, the gap between frequently employed arm-chair approaches and a rational, or logical, approach (which may appear to be superficially similar to the arm-chair technique) is a large one. The *rational approach* plays an important part in every serious investigation involving a criterion and is centered in systematic observation and the logical analysis of the criterion behavior and its products, leading to an inclusion and exclusive designation of the components of the standard or base to be employed in making comparisons. Rational analysis is systematic and it is comprehensive. It aims to result in a description based on the relevancy of possible criterion components, judged from the standpoint of belongingness and representative sampling.

The *empirical approach* to the criterion is a pragmatic one and consists essentially of "trying out" hypothesized descriptions of the criterion, or dimensions composing the criterion, and accepting, modifying, or rejecting the criterion framework in light of experience (e.g., intercorrelation data and evidences growing out of the application of sampling statistics). Thus, employing an empirical approach to school housing problems might conceivably lead to a criterion for adequacy of "classroom lighting" based upon specifications derived from evidence that pupils in classrooms meeting such specifications have fewer visual difficulties and reading problems than pupils in classrooms with differing lighting specifications. Or, in the study of teacher classroom behavior one empirical approach to the designation and refinement of criteria might involve the factor analysis of intercorrelations among observers' estimates of a number of definable teacher behaviors (11).

An argument of this paper is that serious attention to the criterion problem demands that decisions be reached regarding (*a*) the working model, or description, of the criterion to be adopted and (*b*) the criterion measure (or measures) to be employed, and that such decisions be based insofar as possible upon empirically supported, as well as rational (and also practical), considerations.

Such decisions often are difficult and even may lead to the following of a number of alternative lines of attack. For example, a general-type decision frequently confronting the researcher involves the selection of criterion behavior representative of a particular segment, or time sample, from the life history of the producer—a sample of criterion behavior, or a product of that behavior, made from a selected developmental or experience level. Thorndike (21) has called attention to this problem, noting the distinction between *immediate, intermediate,* and *ultimate* criteria and emphasizing the need for specifying the kind of criterion data one attempts to predict. An earlier discussion of criteria of teacher behavior (19) presented a generalized classification of pupil behavior (*the hypothesized product of teacher behavior*) which included *immediate* criterion data such as "manifestations of pupil interest in on-going class activities," *intermediate* criterion data, such as "manifestations of accomplishment upon completion of pupil's exposure to a particular teacher," and *ultimate* criterion data, such as "manifestations of occupational and social adjustment and accomplishment in the after-school life of the pupil." Each of these segments of criterion behavior has importance; and each poses different problems.

The choice of a *criterion measure,* also, rests upon the judgment of the researcher; and there may appear to be a number of criterion measures that can be employed interchangeably. Again, such appearance of interchangeability may be more superficial than real. The intercorrelations between hypothesized criterion measures frequently have been found to range from low to high, and occasionally even to be negative (7, 10, 11). Nevertheless, alternative methods of obtaining criterion data usually are available to the researcher and decisions must be made in light of both technical considerations and practical convenience. One such decision, for example, may involve a choice between *direct* and *indirect* measures of criterion data. The use of data derived from observations of on-going criterion behavior, *behavior in process,* may be thought of as exemplifying a direct approach. Obtaining data relative to the outcome of criterion behavior, the *product* produced by the behavior (e.g., pupil accomplishment and/or adjustment may be viewed as a product of teacher behavior) illustrates an indirect approach. Both provide significant data. One method may be preferred over the other in light of the objective of a particular research. But both kinds may be obtained; and they may lead to quite different kinds of conclusions. In fact, as Brogden and Taylor aptly note:

> One factor frequently making for criterion deficiency is the inclination of investigators to employ only one type of criterion measure. . . . If an adequate analysis of the job situation were accomplished and a decision as to criterion content were made before consideration is given to the most desirable measuring techniques for each job element, it would seem that production records would often be found most desirable for some of the criterion elements and ratings or job samples most desirable for other elements (5, p. 166).

Assuming a multiplicity of approaches to a criterion, it is incumbent upon the researcher undertaking a study to conduct preliminary investigation of the criterion and criterion measures in order to be reasonably assured of their relevance and usability (1, 2, 4, 5, 15, 19, 21, 22).

C. Characteristics of a Criterion

The first set of problems requiring decision-making by the researcher has to do with (*a*) the composition of the criterion (e.g., the dimensional characteristics of the criterion—the functional integrals[4] of behavior that comprise it—and the related problem of the sampling adequacy of the working model or description of the criterion; (*b*) the *interrelation of the dimensions of the criterion;* and (*c*) the *generalizability of the criterion description* to other samples of the same population or to other populations.

It is immediately apparent that if such decisions are to have the advantage of empirical as well as rational evidences, the supporting empirical data must be obtained through the use of selected criterion measures. Thus, a circularity is introduced—criterion measures cannot be chosen until certain decisions relative to the nature of the criterion have been reached; and some of the judgments relative to the nature of the criterion have been reached; and some of the judgments relative to the criterion must remain tentative until reliable estimates of the hypothesized dimensions have been made. But, then this is characteristic of all research in that hypotheses are rationally derived, are empirically tested, and are altered in light of empirical evidence and further rational analysis.

So, for practical purposes, criterion definition and criterion measurement interact and, in a sense, all conclusions about a criterion are relative to the measurement or observation approach employed. The discussion, therefore, of the composition of the criterion, particularly from the standpoint of dimensionality, waiting, and generalizability must recognize that the terms "criterion" and "criterion measure" cannot be entirely independent.

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[4] The term *integral* is used for convenience to distinguish between (*a*) aspects or elements of behavior that by themselves bear no apparent relationship to the criterion and (*b*) *integrals* of behavior, which may be either simple behaviors (such as a particular motor or verbal response) or combinations of behaviors (behaviors that go together to form compounds or patterns of varying degrees of complexity) which possess *functional integrity,* in the sense that they represent significant or salient components of the criterion. (For example, smiling may be a trait, or element, of the teacher's behavior repertoire, but one which by itself might not form an *integral* of behavior in the sense that it designated a major pattern of teacher behavior. Smiling, alone, might be too fragmentary and specific to be of importance. But smiling, together with other related behaviors, might form a pattern of "friendly, understanding" teacher behavior which appeared to possess wholeness, or integrity, for purposes of describing teacher behavior.)

Sometimes, the researcher gives too little thought to this matter of identification of the functional *integrals* of behavior. The criterion he accepts, or attempts to predict, sometimes is too specific and fragmentary to be of importance—or, at the other extreme, may be too broad and abstract to permit estimation and prediction.

1. *Composition of a Criterion*

In considering the composition of a criterion, it is appropriate to take into account (*a*) the dimensional characteristics of the criterion, including the matter of the relative importance of each component of a dimension and of each dimension contributing to the overall criterion, and (*b*) the adequacy or representativeness of the resulting operational description of the criterion.

a. Dimensionality of the criterion. Probably few criteria of practical importance for the student of behavior consists of simple, highly specific, unitary performances. A smile, a gesture, a particular spoken word or phrase, or a single correct answer often bears little apparent relationship, considered singly, to significant aspects of behavior the researcher is attempting to describe or predict. More frequently a criterion is complex rather than simple, multi-dimensional rather than uni-dimensional, heterogeneous rather than homogeneous. It appears probable, for example, that any consideration of teacher effectiveness probably should be hypothesized in multi-dimensional terms which take into account the possibility of different patterns of teacher behavior, effective perhaps for different kinds of educational situations, for different kinds of pupils, and possibly for teachers of different grades or subjects (19).

A major concern of the investigator, therefore, is to determine how the criterion is structured—what its dimension may be. Here the researcher is concerned with recognition of the variables which contribute to the criterion in any appreciable amount—with what the constituent behavioral elements are like and how they combine and are organized into meaningful patterns. Furthermore, he is interested in arriving at the most parsimonious description of the dimensionality of the criterion, and of the make-up of individual dimensions. Thus, one set of questions subsumed under "dimensionality of the criterion" is essentially that of determining the nature of the behavior integrals comprising the criteria. Logical classification and intercorrelational study, including factor analytic approaches, have been found to be useful approaches to such problems (11).

A related set of questions has to do with how the behavioral components comprising a functional integral of the criterion should be weighted when combined. If the criterion dimension consists of elements X_1, X_2, X_3, . . . X_n, what weight should be assigned these elements so that the summation will best represent the hypothetical true criterion dimension? The researcher is concerned, therefore, not alone with the identification of criterion dimensions, but also with the assignment of the proper relative weight to each. General discussions of this problem has been provided by Brogden and Taylor (5), Toops (22), Thorndike (21), and others, and an earlier paper reporting research of the Teacher Characteristics Study (12) undertook the comparison of certain techniques of weighting criterion data in the investigation of teacher behaviors.

b. Sampling adequacy of the criterion. In studying the composition of a criterion the goal is, of course, a working model, or operational definition, which is characterized by both *inclusiveness* and *exclusiveness,* i.e., assurance that the criterion description includes all important behavior integrals which contribute to the criterion behavior and that it excludes all variables that are unrelated to the criterion.

Thus, inseparably linked with the identification of criterion dimensions and their components is the problem of the representativeness or sampling adequacy of the resulting descriptions. Brogden and Taylor (5), Bellows (4), and others have called attention to various sources of criterion bias, and the need for careful job analysis and systematic study of criterion behavior as a means of guarding against bias. In their excellent discussion of *The Theory and Classification of Criterion Bias,* Brogden and Taylor define a biasing factor as ". . . any variable, except errors of measurement and sampling error, producing a deviation of obtained criterion scores from a hypothetical 'true' criterion score" (5, p. 161), and go on to classify the major sources of criterion imperfection: (*a*) *criterion deficiency*—omission of pertinent elements from the criterion; (*b*) *criterion contamination*—introducing extraneous elements into the criterion; (*c*) *criterion scale-unit bias*—inequality of scale units in the criterion; and (*d*) *criterion distortion*—improper weighting in combining criterion elements. Any researcher dealing with the problems of description, comparison, and prediction, and particularly persons engaged in the investigation of teacher behavior, will find reading and rereading of the Brogden and Taylor paper a "must." A review of the literature relating to teacher effectiveness suggests numerous examples where criterion deficiency and criterion contamination (and also scale-unit bias and distortion) seem likely. The vulnerability to criterion bias of certain approaches to criterion designation and measurement will be noted in subsequent paragraphs.

2. *Interrelationships of Dimensions of the Criterion*

In dealing with the characteristics of a criterion, the relative extent of overlapping or interdependence of the defined dimensions is of practical as well as theoretical concern to the researcher. More often than not, the several dimensions of a criterion may be expected to be positively correlated; to show overlapping rather than independence. If the intercorrelations between estimates of criterion dimensions are substantial, differential identification and prediction of the several criterion dimensions becomes difficult and often lacks feasibility even though the dimensions appear to possess rational integrity (e.g., even though the dimensions—height, width, and depth—of a physical object each may possess logical integrity, it may be difficult to find correlated data that will successfully predict one dimension and not the other, due to the high intercorrelations often found between the dimensions of physical objects).

It may be noted that the interrelationships between the dimensions of a criterion may vary considerably with the population studied. For example, teacher characteristics research has revealed what appear to be reliably higher intercorrelations among certain dimensions of teacher classroom behavior for elementary school teachers as compared with teachers at the secondary school level.

3. *Generalizability of Criterion Dimensions*

Still another closely related concern has to do with the generalizability of the behavior integrals (dimensions or variables) comprising the criterion. This problem has two parts, one relating to (*a*) the generalizability of a particular sample of criterion behavior to other samples in the same behavior domain or universe, and the other (*b*) to the generalizability of the criterion to additional samples of the same population and to samples of other populations.

Thus, in (*a*) above, teacher behavior may be highly specific and situational (e.g., the extent of "friendly, understanding" teacher behavior demonstrated by a given teacher may vary with the pupil, the time of day, the mood of the teacher, the subject matter, and other conditions) or, on the other hand, within the limits of definable variability, the "friendly, understanding" behavior of a teacher may possess considerable generality (and therefore some predictability) for different children, at different times of day, in different situations, etc. Only to the extent that the behavior is generalizable, of course, is prediction of any sort possible.

One aspect of the problem noted in (*b*) above has to do with whether defined criterion dimensions are specific to given samples within populations of teachers (i.e., teachers of a given school or school system) or, on the other hand, if criterion generalization is possible. (It may be assumed that this is basically a sampling problem, and that care in the drawing of a random sample or a stratified random sample may assure a certain amount of generality, provided reliable criterion integrals or dimensions have been specified.) The other aspect of (*b*) above refers to the possibility of criterion extension—whether or not the criterion dimensions are generalizable from one population to another (e.g., are dimensions of teacher behavior that apply to elementary teachers equally applicable to high school teachers, or to college teachers?).[5] It seems reasonable to hypothesize, at least, that although the magnitude of the interrelationships among criterion dimensions may vary from teacher population to teacher population, the dimensions themselves possess a considerable degree of generalizability. Several factor analytic studies, for example, have noted generally similar dimensions of teacher behavior in the elementary school, the secondary school, and the college.

D. The Identification and Measurement of Criteria

1. *Designation of Criteria and Their Components*

The derivation of the working model of a criterion (designation of the dimensions and the component elements of each) ideally is a function of the interaction of both rationally and empirically obtained evidence, but the final decisions in which the process culminates must necessarily be a set of judgments. The researcher thus is obligated to acquire a degree of "expertness" with respect to the criterion he is dealing with, and his judgment presumably will be reached following extensive review of what other researchers have uncovered and also, perhaps, empirical study on his own part.

Often the researcher feels more secure in his selection of criterion dimensions if the decisions are based on judgments of other qualified persons in addition to himself (i.e., authorities in the area of the criterion). Needless to say, assurance will be greater (to a point, at least) the larger the number of so-called authorities which may be employed and the more representative such a jury may be of the totality of existing persons considered "expert" in the area. Since researchers in the behavioral sciences frequently do resort to the consensus of opinion of a jury of presumed experts in designating criterion dimensions, it is appropriate to note how such a procedure might properly be followed.

Certainly the point to be kept foremost in mind is that the researcher must be assured that he is not employing a non-random or non-representative sample of authorities (e.g., a jury made up of individuals with whom he happens to be acquainted, or persons he or his immediate associates assume to be authorities, or judges who merely happen to be readily available). Criterion inadequacy and criterion contamination frequently are reflections of the employment of biased judges at the point of the designation of criterion dimensions.

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[5] It should be noted that even when considerable generalizability of criterion dimensions may be assumed, there is no implication of similar generalizability of correlates and predictors of the criterion dimensions.

Essentially the problem of defining the criterion through the employment of a jury consists of (*a*) selecting the authorities who will comprise the jury, (*b*) specifying the procedure to be employed by the judges, and (*c*) assembling and analyzing the responses of the judges in arriving at a consensus or composite of their judgments.

a. Selection of authorities. A jury of authorities may be constituted in any one of a number of ways, some of which are:

1. The jury may consist of the *totality* of the known group of authorities or experts (e.g., all of the shop foremen in a plant, all members of a professional society, all college teachers of a specified subject matter, etc.). Such a procedure, of course, usually is not feasible unless the totality of experts is relatively small.
2. The jury may consist of a *random sample* from the roster or membership list of a known group of authorities.
3. The jury may consist of a *purposive sample* drawn from the totality of authorities as defined. Thus: (*a*) The sample may be one of convenience, or one of arbitrary selection. Obviously, such sampling seldom could be justified or expected to lead to adequate criterion description. (*b*) The sample may consist of members of the totality of authorities who meet some specified minimum attainment with respect to an agreed upon index (e.g., specified frequency of contribution to the professional field through research and publications, specified frequency of participation in meetings of learned societies, etc.). (*c*) The sample may consist of individuals selected on the basis of frequency of nomination as "most expert" or "most authoritative" by members of the total group, or perhaps by random sample of the total group.
4. The jury may consist of a sample of individuals who have been specially trained to make authoritative judgments regarding the criterion (e.g., job analysts, trained observers, etc.).

Such methods as 1, 2, 3b, 3c, and 4 above of choosing a jury of authorities will not necessarily insure valid criterion description, but they represent distinct improvements over 3a—which, unfortunately, is a frequently employed approach in educational and social research.

b. Procedure in designating components of the criterion. Any of several techniques may be employed in obtaining from a jury of authorities the required judgments relative to criterion dimensions. Six such procedures are noted below. Discussion of each may be found in the literature.

1. *Free-response*—non-cued specification of criterion dimensions, or their component elements, and/or judgment about their relative importance, based upon general impressions held by the authorities comprising the jury.
2. *Check-list response*—provision of a previously compiled list of possible contributors to the criterion behavior permitting indication by the authorities of components believed to be actually contributive, and/or indication of the relative importance of the components designated.
3. *Job analysis*—detailed systematic description of the criterion behavior by trained job analysts.
4. *Critical incidents description*—provision by qualified persons of detailed descriptions of actual incidents (behavior taking place in a particular situation at a particular time) which are believed by the reporters to be "critical" in the sense that they "make a difference" in the criterion behavior.
5. *Time sampling*—detailed tabulation of criterion behaviors based upon systematic observation and recording, with special attention to the conduct of observations during representative samples in time.
6. *Psycho-physical methods*—designation of criterion components by judgment of the relative importance of each hypothesized component through employment by the members of the jury of such methods as ranking, equal appearing intervals, paired comparisons, etc.

Following polling of the jury of authorities and collection of their responses, the researcher is faced with the important tasks of analyzing and synthesizing the data. Occasionally this procedure may involve only the mechanical application of statistical methods, but more often content analysis is called for, requiring comparison, judgment, interpretation, and classification (usually followed by coding and statistical treatment) of the authorities' responses in the process of deriving the criterion description or model.

And only after systematic and comprehensive consideration of how the criterion is composed—how it is describable—may attention properly be turned to the selection and development of measures suitable for obtaining working criterion data.

2. *Development of Criterion Measures*

At the beginning of these notes, several questions relating to criterion problems were stated. These questions fell into two major groups, one having to do with decisions regarding the composition of a criterion and the other with available approaches to the measurement of criterion dimensions once they had been established or designated. The remainder of the discussion will be concerned with this latter set of problems—techniques that may be employed for obtaining criterion data.

As noted earlier, the description of a criterion and the development of criterion measures are related and often interacting aspects of the same problem. Brogden and Taylor (5) comment on this relationship, observing that the systematic investigation of a situation in which criterion behavior occurs often supplies the investigator with cues regarding means of subsequently measuring the components of the criterion. And feed-back from the preliminary try-out and analysis of potential or hypothesized criterion measures contribute to the more adequate definition and designation of criterion dimensions. Thus, interaction rather than a sequential relationship characterizes these two steps in the consideration of the criterion problem.

And in the development of a criterion measure—judging the relevance of various measurement approaches, weighting and attempting to attenuate control problems and sources of bias associated with the use of available approaches, evaluating reliability and intercorrelational data, establishing units of measurement, etc.—again, both rational and empirical procedures will be employed.

a. Requirements for an adequate criterion measure. What are some of the standards against which the adequacy of a particular criterion measure or approach may be judged? Basically there are three characteristics of criterion measures the researcher is concerned about: validity, or relevance; reliability; and feasibility.

(1). *Validity or relevance of a criterion measure.* The relevance of a criterion measure is, of course, the really basic consideration. Casual inspection of any matrix of intercorrelations among presumed criterion measures (10) shows far from perfect relationships existing between measurements which on an a priori basis may have been presumed to be measuring the same criterion dimension. Regardless of measurement error and other possible sources of correlation reduction, it becomes readily apparent from the magnitude of the intercorrelations that the presumed criterion measures are not generally interchangeable. It is reasonable to assume the different measures vary considerably in their relevance or validity with regard to a designated criterion component.

(*a*). *Construct validity of a measure.* Mosier (8) calls attention to various aspects of the concept of *face validity*, including validity by appearance, validity by assumption, validity by hypothesis, and validity by sampling. Certainly the uncritical acceptance of a criterion measure in light of either "appearance of validity" or "assumed validity" is dangerous. Yet, these must often provide the starting point for consideration of criterion measures, and when such measurement approaches are suggested by careful systematic study of the criterion, and/or extended experience, their hypothesization may have considerable support.

Although the concepts are not greatly different and may be thought of as merging, a distinction perhaps should be made between face validity and construct validity. The term *construct validity* refers to validity or relevance that is inferred from indirect, though logically related, evidences; to validity which it seems reasonable to assume, but which is implied rather than directly indicated. Construct validity with respect to a criterion measure might be thought of as including Mosier's "validity by hypothesis" and "validity by sampling." Thus, in the study of teacher characteristics, critical analysis might lead the researcher to *hypothesize* that achievement tests of English expression, or of knowledge of subject matter to be taught, or of understanding of child development, provide relevant criterion measures of such dimensions of teacher behavior as have to do with the communication of subject matter and with the motivation of learners. And the employment of observers' assessments based on time samples of teacher behavior obtained under varying conditions might be said to possess construct validity (*validity by sampling*) for the measurement of teacher behavior. Again, the discovery through factor analysis of a general factor, or of a group factor common to several criterion measures, and the choice of criterion measures in light of their loadings on such a factor might be thought of as the employment of construct validity. Such merging of rational and empirical evidences, for the most part relatively indirect, provides an important and useful source of information for judging the relevance of criterion measures.

(*b*). *Sampling adequacy of criterion measures.* As in the establishment of criterion dimensions, also in the development of criterion measures the researcher must be constantly alert to sampling adequacy and the possibility of the introduction of criterion bias. It is important that a criterion measure be both comprehensive, or inclusive, and also that it *not* measure behaviors extraneous to the criterion dimension.

Again, attention is called to the thoroughgoing discussion by Brogden and Taylor of source of criterion bias and the need for assurance that criterion measures are as bias-free as possible. As these writers point out, the chief reason for avoidance of bias in the criterion in prediction and diagnostic research is to obviate the possibility that the to-be-developed predictor will measure something other than is intended. Thus, *predictor-correlated bias* in the criterion usually is the problem the researcher must be most concerned about:

> Biasing factors correlating with the predictors will obviously distort the validities and the partial regression weights of the various predictors. They may even result in the inclusion of tests in the battery that predict only bias and have no relationship to the "true" criterion. The introduction of bias having no relation to the predictors is . . . equivalent . . . to an increase in the error of measurement of the criterion. . . . In spite of . . . adverse effects of test-free bias, it is believed that, effectively, it is the presence or absence of test-correlated bias that "makes" or "breaks" the criterion (5, p. 163-164).

The imminence of predictor-correlated bias and the need to be on the lookout particularly for predictor-related contaminating characteristics of criterion measures is especially acute at the time of selection and development of criterion measures.

Of the sources of error they describe, Brogden and Taylor observe that *contamination* and *scale-unit bias,* particularly, are the classes of bias apt to be introduced in the development and application of measures of a criterion. Sources of criterion contamination frequently associated with criterion measurement are, among others: (*a*) *opportunity bias*—bias resulting from differences in opportunity for production, or behavior, among different individuals (e.g., during a given time sample no situation may occur which might provide Teacher *A* with an opportunity to demonstrate certain characteristics she actually possesses, whereas Teacher *B,* in a similar time sample, may be presented with ample opportunity to reveal behavior in the domain under observation); (*b*) *experience bias*—bias resulting from varying amounts of experience of different individuals *re* a given performance (e.g., a student teacher or practice teacher may exhibit characteristics of classroom behavior differing qualitatively and quantitatively from those of a more experienced in-service teacher); and (*c*) various *rating biases,* such as those associated with halo effects and with inferences based on assumed symptom-criterion relationships (5).

In addition, it may be noted that when ratings or assessments are employed, criterion *distortion* frequently is introduced through duplication, or inclusion of highly similar components, in the criterion measure. (This should not be confused with replication of measurement which is generally desirable.) Such duplication, for example, may be present when several generally similar behaviors are included in a rating scale thus giving unintended disproportionate weight to the duplicated aspect of the criterion. Still other rating "errors" such as the so-called central tendency error and leniency error (resulting, respectively, in leptokurtic and skewed distributions of assessments) contribute to criterion scale-unit bias.

(*c*). *Knowledge of specificity vs. generalizability of a criterion measure.* A third aspect of the problem of the validity or relevance of a criterion measure has to do with its generalizability, (*a*) to other criterion measures and (*b*) to other samples of the same population or of other populations.

The basis for evaluation of a measure with regard to the first of these matters is found in the matrix of intercorrelations among different criterion measures. If the interrelationships of a particular measure with other measures are substantial, it may be assumed that the specified criterion measure is fairly generalizable—possesses certain characteristics in common with other measures. If the interrelationships are of a low order, uniqueness of the specified measure is indicated. Specificity or uniqueness is a desirable characteristic of a criterion measure if, *and only if,* it can be demonstrated the measure reflects an important aspect of the criterion and is relatively free of bias. Other things being equal, unique or specific measures of all behavior integrals comprising the criterion behavior characterize the model or ideal criterion measurement sought by the researcher.

The generalizability of a criterion measure to other samples of the same or of other populations is, of course, quite a different problem—one of sampling variability. Unless a measure maintains its relevance when applied to the criterion behavior of other similarly drawn samples of the same population, it has no value for the researcher. If the measure continues to possess relevance when application is extended to other populations, its potential usefulness is still greater.

Evidence of specificity and of generalizability of criterion measures cannot be assumed or inferred from indirect sources; supporting evidence necessarily must be based upon empirically obtained data.

(2). *Reliability.* A second standard by which the adequacy of criterion measures is judged is that of consistency, or reliability. Consideration of this characteristic of a criterion measure follows in general the same rationale as that advanced relative to the problem of test reliability. And the same approaches (i.e., equivalence, stability, and internal consistency) may be employed. Strictly speaking, reliability of criterion measures might properly be considered a sub-topic of validity. Certainly a criterion measure can be valid only when it is relatively stable. And the development of a predictor of a criterion measure becomes impossible unless the criterion measure presents some degree of consistency.

A criterion measure yields reliable data to the extent that the measurements it provides are free from fluctuations, or variable error. A product of performance, taken as a criterion measure, is reliable if it may be replicated and if such replications show a high degree of similarity or consistency. A rating of behavior-in-process may be thought of as reliable if assessments of that behavior, made by different observers at different times, are similar or consistent.

Generally speaking, the reliability of criterion measures, whether the measures relate to products of performance or to behavior-in-process, is affected by four sets of conditions: (*a*) consistency or replicability of the criterion behavior itself; (*b*) conditions under which the criterion behavior takes place—and the extent to which such conditions do or do not vary from situation to situation; (*c*) degree of specificity with which the behavior, or its product, is described and measured; and (*d*) consistency of the measuring instrument and/or procedure associated with the assigning of measurements (e.g., the commonness of approach of judges or evaluators of the behavior or product). Therefore, other things being equal, the reliability of criterion data may be expected to be greater: (*a*) the more extensive the replication of the criterion measurement (including extension of the time sample—the time spent in observation); (*b*) the more objective the recording of observations of behavior or evaluations of a product (which implies the employment of comparable units of measurement); (*c*) the fewer the conditions leading to varied interpretations of, or inferences about, the behavior or product; (*d*) the less the variation in the situation under which the behavior takes place from time to time; (*e*) the more homogeneous and operationally describable the criterion dimension. Attention has been called to the possible influence of a number of such factors in the study of teacher behavior by other reports (13, 19).

The reliability of criterion measures may be estimated by obtaining correlations between (*a*) products, (*b*) repeated measures of production, (*c*) assessments of different observers, and (*d*) repeated assessments by the same observer over varying periods of time. As in test analysis, the problem of reliability may be approached either from the standpoint of correlation and covariance or from that of the standard error of measurement. It may be noted also that, as in test analysis, where replication of criterion measures is employed, the Spearman-Brown formula may be applied in estimating the reliability of measurement from combined estimates.

(3). *Feasibility.* A third, and obvious, requirement of a criterion measure is that it be relatively convenient to use. There is no denying the importance of practical considerations and the frequent need for compromise resulting in the use of measurement procedures somewhat more subject to error than would be desired in an optimal measure. Probably in most situations involving *natural* behavior, or field behavior, it is necessary to employ criterion measures which have technical shortcomings. The important thing is that the researcher recognize such shortcomings and their possible (though usually unknown) effects upon the resulting data. Thus, while powerful argument can be mustered in favor of "pupil change" as a criterion measure for the study of certain dimensions of teacher behavior, practical (and also technical) difficulties are likely to preclude its use; classroom observations by trained observers may provide a somewhat less perfect, but definitely more feasible, method of obtaining the criterion data.

b. Some approaches to obtaining criterion data. Various approaches to obtaining criterion data in the study of teacher characteristics and related problems have been suggested in the reports of the *A.E.R.A.* Committee on Criteria of Teacher Effectiveness (1, 2), by the writer (11, 13, 16, 19), and by others. The present note attempts only to call attention to certain various classes of criterion measurement that may be employed.

(1). *Direct measurement of the criterion.* Direct measurement of the criterion here refers to the assessment of behavior-in-process—the actual on-going performance of a task; the behavior itself. The assessment by trained observers of the behavior of a teacher while conducting a class is an example of the direct measurement of criterion behavior.

Direct measurement of criterion dimensions may involve either the assessment of criterion behavior in its "natural setting," or assessment in artificially structured situations approximating, or simulating, the natural behavior. The observation and assessment of teacher behavior in the teacher's own classroom illustrates the first case; observation and ratings under situational test conditions (exemplified by the procedures developed by the *O.S.S.*, by teaching tests employed by some school systems, and by performance tests sometimes used by industry) are illustrations of the second. There are certain advantages to the employment of artificially structured situations and such situations often possess a degree of face validity. Nevertheless, experience suggests the need (often unrecognized) for particular care to considerations of *sampling* adequacy (e.g., vulnerability to various kinds of criterion bias) and *generalizability* when criterion measurement is attempted under artificial conditions.

The actual observations and assessment involved in direct measurement may take a variety of forms, some of which are noted below.

(*a*). *Systematic observation and immediate assessment of the criterion behavior by trained observers.* Probably the most satisfactory approach to the direct measurement of criterion behavior is through the use of observers who are trained to observe selectively specified criterion elements and to record immediately assessments thereof. Such systematic observation implies prior analysis of the criterion behavior, designation of criterion elements and dimensions development (including try-out and subsequent analysis) of the observation record or assessment scale, investigation of the relevance and reliability of the assessment procedure with other samples, and intensive training of the observers both in making systematic observations and in use of the assessment record. Only when such steps are followed can the influence of criterion bias be minimized.

Various considerations involved in obtaining criterion data through systematic observation and assessment (e.g., obtaining representative samples of the criterion behavior, conditions affecting the validity and reliability of assessments, the observation procedure and training of observers, devices for recording assessments, etc.) and the experience and results of the employment of trained observers by the Teacher Characteristics Study are reviewed in some detail in another paper (13). Suffice it to note here that when the direct measurement of criterion behavior is undertaken the obtained data are more likely to be relevant to the extent: (*a*) the dimensions of the criterion behavior have been specified and unequivocally defined in operational terms; (*b*) the observer recognizes the behaviors he is supposed to be looking for and makes assessments on those, and *only those,* characteristics; (*c*) the observer focusses his attention on specific actions and carefully avoids contamination of assessment by "general impressions," behaviors that stand out prominently or unusual behaviors that obscure typical behavior, inferences about the meaning of behaviors, and inferences about what the behavior might be like in unobserved situations; (*d*) the observations are conducted with proper attention to time sampling—the observations are not too limited to provide for opportunity for occurrence of the criterion behavior; (*e*) the observer makes his assessments during or immediately following observation; (*f*) the observer makes separate assessments of each specified component of the criterion behavior considered independently; (*g*) the "naturalness" of the situation in which the criterion behavior occurs is preserved; (*h*) the observer is capable of recognizing the influence of, and setting aside, personal biases relative to individuals and/or behaviors under observation;

(*i*) the observer remains aware of, and conscientiously seeks to avoid, various rating biases such as the so-called central-tendency error, the leniency error, and others; (*j*) replication of observation and assessment by independent, though similarly trained, observers is provided for.

(*b*). *Non-systematized observation and assessment by untrained observers.* The most frequently employed (and at the same time most hazardous and least well controlled) direct measurement procedure utilizes more or less casual observation and assessment by untrained observers who may be presumed to possess widely varying noncritical concepts of the criterion components and their relative importance.

Assessments produced by untrained observers and based upon non-systematized observation occasionally are accomplished during, or immediately following, observation of the behavior. More frequently, however, they are retroactive, reflecting general impressions of the subject's criterion behavior as recalled by the assessor—thus introducing additional uncontrolled conditions and sources of probable criterion measure bias.

Also, assessment of criterion behavior by untrained observers may be either *analytical* (separate evaluations accomplished with respect to each of several designated criterion characteristics) or *general* (overall ratings provided of broad, general aspects of the criterion behavior). Although analytical assessments appear to possess superiority when observers have been trained in the conduct of systematic observations, there is some evidence that such an advantage does not hold for non-systematized observation by untrained observers—rather, that non-analytical or general ratings are as satisfactory as, and perhaps superior to, analytical assessments when the numerous uncontrolled conditions operant in informal evaluation are involved. Rational support also can be found for such a position.

Ratings or assessments based upon non-systematized observation may be contributed by "judges" associated with the individual being judged in various relationships. In the literature relating to teacher behavior and teacher effectiveness, assessments made by school principals and supervisors very frequently are reported. Or, assessments may be made by the teacher's pupils, or perhaps by the teacher's peers—her fellow teachers. The use of any one of such groups of judges presents unique problems relative to bias and control, and all are subject in common to serious limitations with respect to sampling adequacy. Assessment by untrained observers, based upon non-systematized observation, is vulnerable to all the classes of bias listed by Brogden and Taylor—deficiency, contamination, distortion, and scale-unit bias.

A word of caution may be noted here which pertains to any situation in which direct measurement is employed. This has to do with the important control problem introduced by the possible influence of the observer upon the behavior of individuals whose criterion behavior is being observed and assessed. Procedures for reducing the effects of such contaminants have been discussed, and employed, by social researchers and reports may be found in the literature.

(*c*). *Automatic measurement of criterion data.* Under certain conditions (usually restricted to very limited aspects of criterion behavior, and best adapted to performance-test situations where salient characteristics of the criterion behavior are readily definable) it may be possible to utilize methods for the automatic recording of criterion data and thus measurement of the criterion behavior as the behavior proceeds. Such an approach to criterion measurement usually is applicable only when replicated acts are involved, or when a common unit of behavior may be abstracted from varying acts, and when behavior counts reflect significant aspects of the criterion behavior. Generally speaking, it seems unlikely that many behavior integrals significantly related to teacher behavior may be so objectively and mechanically measured.

(*d*). *Self-reports of the producers of criterion behavior.* Strong argument sometimes is presented for the use of criterion data based upon the self-reports of the individuals producing the criterion behavior. Thus, it is not uncommon for the scales of personality inventories and schedules to be validated against internal consistency criteria—i.e., rationally defended composites of self-reported behavior.

It seems debatable that self-reports of producers of criterion behavior can be of value for other than very specialized purposes. They may provide valid and reliable criteria data provided (*a*) the criterion behavior to which they refer is not too complex, (*b*) the respondent is a good introspector and retrospector, (*c*) self-reports are based upon behavior that has been clearly and operationally defined—which takes place under relatively rigidly defined conditions, and (*d*) replication is employed to obtain self-reports covering an adequate number of situations in which the criterion behavior may occur. For the investigation of complex on-going behavior, such as teacher classroom behavior, self-reports do not seem likely to be useful as criterion measures. They are subject to practically all of the sources of criterion bias, various examples of which already have been noted.

(2). *Assessment based upon a preserved record of the behavior-in-process.* Under certain conditions some of the sources of bias introduced by direct observation of behavior may be reduced through the recording of behavior-in-process and its preservation for later analysis and assessment. Thus, through the use of motion pictures, sound tracks, tape recordings, and the like, it may be possible to circumvent one set of difficulties encountered in the direct observation and immediate assessment of behavior—namely, the problem of adequate analysis and assessment of behavior which is momentary or transitory. With a preserved record, a behavior may be reviewed any number of times, analyzed in detail, and assessed by many more judges or observers than usually can be employed in direct observation. There are obvious advantages to the procedure if it may be adapted to the criterion behavior with which the researcher is concerned. But in a teacher-classroom situation, for example, many practical difficulties are encountered. Ideally sound motion pictures, taken with a hidden camera and with adequate distribution of microphones, of samples of teacher-class behavior appear to provide a very desirable means of obtaining certain kinds of criterion data. But the problems of lighting, photography, obtaining the films and records without knowledge of the participants, etc., ordinarily will rule out such an approach. The principal control problem, therefore, is centered in the use of the recording equipment and its possible effect in distorting the natural behavior of subjects whose criterion behaviors were being photographed or recorded.

Needless to say, if such an approach is applicable recording errors are reduced to a minimum and subsequent systematic observation and assessment by trained judges should be expected to yield highly reliable criterion data.

(3). *Measurement of a product of the criterion behavior.* An opinion held by many in the field of prediction research, and for which the rationale seems sound, is that the most satisfactory measure of a criterion is one derived from the *product of performance*—that judgments based upon the observation of behavior-in-process merely are incidental and are of little value compared with measurements of the product.

In employing products for the measurement of criterion dimensions, details of the actual performance-in-process usually are ignored; interest is centered not in the behavior *per se* that contributes to production, but rather in the final outcome. Concern is not with behaviors, but with *effects of behaviors*. Thus, in learning research the most reasonable criterion of learning behavior usually is held to be "achievement" resulting from the difficult-to-observe learning process. Similarly, the behavior of pupils (their accomplishments) may be considered the *product* of a teacher's efforts and the most suitable of criterion measures of teacher behavior.

The chief disadvantage in the use of products as criterion measures is the difficulty of adequately controlling external factors in order to provide reasonable assurance that the hypothesized product is truly a product of the criterion behavior rather than that of a wide range of uncontrolled conditions occurring prior to and concurrently with the criterion behavior.

If the situation is such that conditions can be carefully controlled (as in laboratory learning studies) the behavior product probably will be agreed to be the most desirable criterion measure. As situations become more complex and control less possible, the value of the product as a criterion measure diminishes.

(*a*). *Products affected only by the criterion behavior.* In situations where the criterion behavior-product relationship may be assumed to be direct and uncontaminated, use of the product for the measurement of the criterion is of unquestionable value. The product is affected solely, or almost so, by the criterion behavior; other conditions that may influence the product are effectively controlled. Such control is difficult to achieve but is possible in certain kinds of relatively straightforward studies, particularly those amenable to laboratory investigation.

In the study of teacher behavior the employment of pupil change for criterion measurement probably can be adequately defended only in narrowly defined experimental situations, such as one in which (*a*) the teachers being judged carry out their teaching with groups of children who have been matched with respect to a number of relevant factors (including similarity of earlier teacher influences and learning experiences) and (*b*) the measured product (learning) is related to a relatively simple task which can be completed in a single sitting or experimental session. Such controls, difficult as they may seem to execute, still are far from complete and are mentioned above merely to illustrate the exactitude required of experimental designs in which it could be most reasonably assumed that pupil change was really a product of teacher behavior.

True, randomization may be expected to balance out the effects of uncontrolled factors if the number of pupils contributing to the product-measurement is large, but, with so many known sources of systematic variance affecting the product and with the limited number of pupils usually available for the study of a given teacher, it seems doubtful that pupil change measurement can be of as much use as it might appear at first glance (18).

(*b*). *Product affected by criterion performance and additional uncontrolled factors.* In the employment of behavior products for criterion measurement the more usually encountered situation is one in which the product reasonably may be assumed to be affected by the criterion performance but where such effects are likely to be confounded and contaminated by the effects of various uncontrolled factors. Thus, at the opposite extreme from the rigidly controlled example cited in (*a*) above, might be the estimation of teacher behavior from its presumed product consisting of pupil achievement in some specified area measured at the end of a semester's exposure to the teacher. Factors in addition to the teacher that might contribute to pupil achievement (text books, prior learning, previous teachers, home influence, influence of peers, ability, study habits, emotional makeup, etc.) and their differential effects on different pupils, are not taken into account in such a research design. Obviously the value of such criterion measurement usually would not be great.

Examples illustrating an intermediate position between (*a*) and (*b*) above, involving pretesting and posttesting of pupils and the control of certain factors occasionally may be found in the literature. The efficacy of such an approach to criterion measurement may be judged to be intermediate between the two extremes, depending upon the extent to which adequate control is possible.

An additional consideration relative to the employment of products for the purpose of criterion measurement has to do with the *proximity in time* of the product evaluation and the occurrence of the behavior which is hypothesized to be the producer. Frequently the passage of time and the consequent introduction of additional influences has considerable effect upon a product. Thus, product measurements obtained during or immediately following the producing criterion behavior and measurements obtained of the same product after delay, may show substantial differences.

In the study of teacher behavior, examples of products measured during or immediately following the producing criterion behavior might be either (*a*) direct observation and assessment of pupil behavior in the classroom (such assessments presumably reflecting teacher behavior) or (*b*) the measurement of pupil change (based on pretests and posttests) over a semester in some specified subject matter area such as arithmetic or social studies. In the case of either example, "current on-going pupil behavior" or "pupil change," it must be recognized that many biasing conditions such as those noted elsewhere in this paper (and also in Reference 19, pp. 5-8) may be influencing the product and reducing the validity of the criterion measure.

An example of the delayed measurement of a product of teacher behavior would be the determination of accomplishments or success of former pupils of a teacher with a period of time intervening between termination of the teacher-pupil relationship and measurement of the product (pupil accomplishment). To the writer's knowledge no systematic studies of this sort have been attempted, although approximations of case studies, citing the later life accomplishments of former pupils of a teacher occasionally are published in support of a particular teacher's influence. The use of delayed measurement of the product again introduces additional control problems and renders it difficult to discern direct criterion behavior-product relationships. Only if large numbers of pupils of a given teacher could be followed up and compared with respect to agreed-upon "criteria of accomplishment" might such an approach to criterion measurement be looked upon as promising. Furthermore, long time studies of this sort present numerous practical difficulties in addition to the technical ones.

(4). *Measurement of concomitants of criterion behavior.* Judging from studies reported in the literature it is not uncommon to employ measurements of known, and *more often presumed,* concomitants of a criterion as substitutes for basic criterion data. The use of substitute data of this sort frequently is defended on the grounds of "obvious" relationship (e.g., the use of an "educational principles and methods" test to provide measurements of teaching ability) and sometimes because of the unavailability or impracticality of more direct measurement of a criterion.

Such a practice presents many hazards, but if reliable correlates of a criterion dimension can be ascertained and if such correlates are fairly numerous, the measurement of concomitants may provide an acceptable substitute for more direct criterion data. In fact, in some instances where the original criterion measurements are unreliable, it is conceivable that a battery of concomitants might even provide measurements superior to the original data.

(*a*). *Measurement of behaviors, or products, known to be related the criterion.* Obviously the most defensible use of correlates or concomitants for the measurement of a criterion dimension is in the case where the correlate is a behavior, or a product, that is *known* to be related (i.e., for which there is considerable evidence of relationship) to the criterion behavior. Knowledge of such relationship implies prior study which has been sufficiently extensive to permit generalization. For example, certain data from the Teacher Characteristics Study strongly suggest that such teenage activities as reading to other children, caring for children outside the home, taking charge of a class for a teacher, etc., are positively and significantly correlated with direct measurements of certain dimensions of later-life teacher behavior as assessed by trained observers. Under certain circumstances the use of indirect data provided by such known concomitants of a criterion dimension would seem to be acceptable. It should be recognized, nevertheless, that existing biases in both the original criterion measure and the correlate may thus be compounded.

(*b*). *Measurement of behaviors, or products, assumed to be related to the criterion.* More frequently than where the concomitant-criterion relationship is known, is the case where some concomitant is assumed to be associated with a criterion on the basis of what seems to be reasonable considerations. The acceptability of measurements of assumed concomitants usually is not as great as in (*a*) above. Nevertheless, there sometimes are indirect evidences leading to considerable support for the employment as criterion measures of concomitants of teacher behavior such as attainment in a "child development" course or in practice teaching. Certainly the teacher training curricula, of which such courses are a part, assume a relationship between understanding of course content and teacher classroom behavior. Concomitants of this nature, involving validity by assumption, by inference, and perhaps by hypothesis, frequently are employed in obtaining criterion measurements. In this connection, Thorndike's discussion (21) of immediate, intermediate, and ultimate criteria should be recalled.

The measurement of criterion behavior in terms of concomitants assumed to be related to that behavior has been undertaken in several manners, some of which follow.

(*a*) *Measurement of concomitants of a criterion, based upon systematic observation.* A single example will be cited. Such characteristics as good health, freedom from physical disability, and the like often are assumed to be concomitants of the satisfactory performance of teaching responsibilities. Provided the assumption of such a relationship is acceptable, criterion data may be obtained through systematic observation (physical examination) and the assessment of aspects of health and physical well-being by a qualified medical examiner.

(*b*) *Measurement of concomitants of a criterion through non-systematic observation.* Such characteristics as "being anxious to please," "causing no trouble," and other similar abstract qualities sometimes are assumed to be related to dimensions of a criterion (e.g., teacher behavior) and measurements of presumed criterion behavior are derived from assessments relative to such qualities, provided by an individual's associates (e.g., ratings submitted by a teacher's principal, his students, or his fellow teachers). The assumption of a relationship between such characteristics and a criterion dimension of teacher behavior are correctly viewed with caution. Furthermore, the general impressions upon which such ratings are based are subject to many sources of bias. So-called criterion data of this sort usually can be of very little value.

(*c*) *Measurement of concomitants of a criterion through self-reports.* Occasionally in studies of teacher behavior self-reports relative to the teacher's liking for his work, satisfaction with working conditions, recognition of his shortcomings, etc. are assumed to be reliable correlates of important criteria of teacher behavior. (Similarly, estimates of the success of a counseling procedure, or the value of a conference program, sometimes are obtained through self-reports of the client, or the participant, who indicates on a rating scale the extent to which he believes himself to have profited from the experience.) Aside from the unknown relationship between an assumed concomitant and salient aspects of a criterion, such self-reports seldom can be expected to be free from the deficiency and contamination biases which characterize so many criterion measures.

(*d*) *Measurement of a behavior product assumed to be a concomitant of the criterion.* Scores derived from tests, inventories, questionnaires, and the like frequently are employed as criterion measures, the relationship between such *products* and the criterion behavior being essentially unknown. The argument for the usability of such substitute measures of criterion behavior is largely from the standpoint of construct validity—general agreement by "authorities" that certain knowledge, abilities, skills, and personal characteristics are closely associated with performances constituting the designated criterion behavior. Certainly it could be argued, for example, that measurements derived from suitable achievement tests in English expression and communication skills yield data suggestive of teacher performance on certain criterion dimensions. However, for many types of presumed criterion data derived from tests and inventories (numerous examples of which may be noted in the literature) the case is not well supported, and the use of such substitute measures often contribute to material criterion contamination.

Generally speaking the employment of any kind of assumed concomitants of criterion behavior to yield criterion data is highly open to error and should be undertaken only when the rationale is particularly sound—and perhaps then with extreme caution.

E. SUMMARY

Review is undertaken of a number of considerations relative to the designation and measurement of criteria, with particular attention to problems confronted in the investigation and attempted prediction of characteristics

of teachers and similar groups. The discussion includes the topics noted in the following outline.

1. *The Criterion Problem in Behavioral Research*

- Nature of a criterion.
- Arm-chair rational, and empirical approaches.
- Decisions required in selecting criterion dimensions and criterion measures.

2. *Characteristics of a Criterion*

- Compostion of the criterion
  - Dimensionality.
  - Sampling adequacy and sources of bias.
- Interrelationships of criterion dimensions.
- Generalizability of criterion dimensions.

3. *The Identification and Measurement of Criteria*

- Designation of criteria and their components.
  - Selection of a jury of authorities.
  - Procedure in designating criterion components.
- Development of criterion measures.
  - Requirements of criterion measures.
    - Relevance or validity.
      - Construct validity.
      - Sampling adequacy and freedom of bias.
      - Knowledge of specificity *vs.* generalizability.
    - Reliability.
    - Feasibility.
  - Some approaches to obtaining criterion data.
    - Direct measurement of the on-going behavior
      - Systematic observation and immediate assessment.
      - Non-systematized observation and assessment.
      - Automatic measurement.
      - Self-reports of producers.
    - Measurement based on preserved records of on-going behavior.
    - Measurement of a product of the criterion behavior.
      - Products affected *only* by the criterion behavior.
      - Products affected by confounded factors.
    - Measurement of concomitants of the criterion behavior.
      - Concomitants known to be related to criterion behavior.
      - Concomitants assumed to be related to criterion behavior.

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SUCKING BEHAVIOR: A REVIEW OF THE LITERATURE*

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A. INTRODUCTION

The degree to which variations in early experience can affect the later behavior of organisms has become a key problem in psychological research. It is also a complex problem, involving factors difficult to control or isolate. Beach and Jaynes (5) have recently reviewed the relevant literature, and stress both the importance of the study of the effects of early experience and the difficulties involved in such studies.

A symposium on early experience factors was held at the Jackson Memorial Laboratory in 1951 and reported in the "Minutes of the Conference on the Effects of Early Experience on Mental Health" (50). There was general agreement that early experience has important consequences. The perceived problem was to assay accurately the degree to which individual factors influence the behavior of the mature organism. Areas marked by dissention or prolonged discussion were those concerned with methods of approach and possible mechanisms responsible for perseverating effects. One symposium during this conference dealt with the behavioral effects of sucking deprivation. This is a problem area in which theory, research, and clinical opinion were all available. Considerable disagreement was expressed, and to some extent this state of affairs still exists. Experimentation and interest in the area is increasing rapidly, but results are conflicting, and the picture is still far from clear.

We have attempted to survey in this review items in the literature relating to controlled experimental studies of the mammalian sucking response. This material was used as a basis for our own studies on the effects of early enforced weaning in puppies.

B. THE MECHANICS OF THE SUCKING RESPONSE

The sucking response, complete with its accompanying orientation movements, is one of the earliest complex behavior patterns exhibited by new-

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born mammalian forms. As such, it has been of interest to scientists of many disciplines. We shall review here those studies which have approached the sucking problem from a descriptive, physiological, or neurological point of view. Blanton (8) discussed infant reflexes at length, and found sucking and swallowing responses to be fully functional 12-15 hours after birth. Sucking before this was not judged to be well coördinated, although all of his *S*s sucked during the first hour. Occasional finger sucking immediately after birth was also observed.

Schmidt (49) disproved the theory that sucking acted as a psychic stimulant of gastric activity. Analyzing gastric secretions after various methods of feeding young infants (including dry sucking), she found that sucking did not exert a reflex influence on gastric secretions.

Eckstein (13) established the sucking response as a criterion for the determination of taste discrimination in young infants. With sucking as a measure, he found differentiation of taste sensation in premature babies. Also, responses to specific tastes were quite specific from *S* to *S*. The sensation "bitter" particularly resulted in a predictable inhibition of the sucking reflex.

Baliassnikowa and Model (2) described the sucking response as a chain reflex compounded of search or orientation reflexes, the sucking act, and swallowing. Stimulation by visual, auditory, thermal, pressure, gustatory, or olfactory stimuli either facilitated or inhibited the sucking response. Pain stimuli were reported to be ineffective. Sucking of new-born infants was classified as (*a*) absent, (*b*) weak, (*c*) normal, and (*d*) strong. A possible connection with autonomic nervous function was demonstrated by the quickened pulse rate, face-flushing, and penile erection usually present with the sucking response.

Woodstock (56) emphasized a swing away from the belief that non-nutritional oral habits such as thumb sucking must necessarily have a sexual implication. He described organic conditions that do have a definite relationship to excess sucking, such as colic, flattulence, and a possibility of asymmetry and disharmony of facial and dental development. Halverson (21) described the occurrence of non-nutritional sucking at the nipple after the sixth week of life, and observed earlier instances of thumb-sucking. He attributed the faster rate of non-nutritive sucking to the lack of swallowing. Bieber (7) called attention to an interrelationship between the grasping and sucking patterns. Mutual facilitation and enhancement were hypothesized, with grasping a necessary accessory, first for support during the nursing stage and later for bringing objects to the mouth.

Peiper (37) studied the rhythmic interplay of breathing and the sucking reflex by means of simultaneous kymographic recordings. In full term infants the breathing reflex adjusts itself to strong sucking movements, indicating a probable dominance heirarchy in favor of the latter. Weak sucking, however, often had little effect on respiration. Sucking and respiration were often reported to be simultaneous and Peiper maintained that even swallowing often occurred without interruption of breathing. Later evidence makes the finding doubtful. In the main, however, Peiper agreed with Baliassnikowa and Model (2), who maintained that swallowing is typically a continuation of the sucking movement, each being an integral part of the coördinated movements of ingestion. Peiper (38) demonstrated that the respiratory rhythm changes immediately during sucking to the rhythm of the sucking. As soon as swallowing begins, however, both the sucking and respiratory reflexes take up the new rhythm. Of possible importance was the general tendency for the sucking rate to be higher than the breathing rate. By the use of an X-ray technique the position of ingested milk in its temporal relationship with units of the behavioral sequence was photographed. He found that milk entered the mouth while the lower jaw was being elevated following the suck. From this point the milk was either propelled directly into the esophagus (one swallow per suck) or held in the mouth until the milk from several sucks accumulated (one swallow per two to three sucks).

Halverson (22) used a kymographic stethoscopic technique on the same problem. Swallowing was found to be of short duration and never coincided with breathing activity. The chest and abdomen were found to be an aid to both sucking and breathing of normal intensity. When sucking, swallowing and breathing were all coördinated, and breathing was adjusted to the sucking, swallowing rhythm. A low breathing rate appeared to be more essential for coördination than a low sucking rate, and coördination was best when both were low. A major contribution of this paper was the emphasis on variability between infants in respect to the interrelationships and degrees of emphasis of these behavior patterns.

In a later paper Halverson (23) tested two premature infants by similar methods. He found that it was possible to establish good coördination between the activities of food-taking and breathing activities before the end of the normal gestation period.

Balint (3), in an attempt to discover individual differences in infants, chose sucking behavior of bottle-fed infants as most promising. The most important finding was the remarkable consistency in the behavior of the individual infants. There was considerable variation from one infant to another. Balint emphasizes the basic nature of the infant's rhythm and suggests that this is carried over into later life.

The neurological bases of the sucking response have not been established. Hooker (25) provided a possible key to the problem by demonstrating the emergence of the sucking reflex in the twenty-ninth week of embryonic life. He stimulated the lip area of foetuses with a small wire brush in order to produce the response.

In personal correspondence, Harman[2] has suggested the trigeminal-facial complex as a possible sucking center, but experimental evidence is lacking. A great deal of further work is obviously necessary to establish the functional-anatomical details of the sucking response.

In general, sucking activity in the human infant is made up of a number of simple motor responses. Orientation movements of the head precede it, and grasping movements accompany it. Mouth movements and swallowing appear to be a chain of reflexes. Breathing may be partially coördinated with sucking. Sucking rhythms tend to be consistent for individual infants.

C. The Significance of Sucking Experience

Freud (16) attached important significance to human sucking behavior. He listed the mouth as one of the erotogenic "pleasure-giving" areas of the body, deriving its share of the initially diffuse sexual energy by attempts at compensatory satisfaction at the more destructive oral level. The concept of an "oral character," deriving from early oral deprivation is explicit in the writing of both Freud and Abraham. Glover (20) elaborated the initial conception. Oral character traits are pictured as originating from repressed oral impulses which undergo transformation into permanent behavior patterns through such processes as displacement and sublimation. Several of the traits attributed to orally gratified individuals were excessive optimism, generosity, and sociability. The orally deprived, on the other hand, were pictured as depressed, pessimistic, insecure, passive, and withdrawn. Fixation at Abraham's oral-sadistic level would be typified by hostility, ambivalence, covetousness, envy, etc.

Mursell (34) proposed the thesis that mild drug habits are essentially survivals of infantile sucking gratification projected into the medium of adult social intercourse. Social drinking, smoking, etc., were hypothesized to be based on a *need* for oral manipulation. He did, however, stress the original nutritional value of oral response as the determinant of later oral behavior to the exclusion of the sexually oriented zone theory of Freud.

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[2] Dr. Pinckney J. Harman, personal communication, 1953.

Levy (30) questioned mothers on the early feeding histories of 123 children. The results indicated that babies deprived in some way of normal sucking opportunity later developed the highest incidence of thumb-sucking. He concluded that oral deprivation was the chief determinant of thumb-sucking and other non-nutritional oral behavior. His study postulated a basic need to suck, which manifested itself quite apart from the hunger drive. A majority of subsequent papers on the function of sucking have defended or attacked this point of view.

Olson (35) investigated the frequency of oral gestures, including thumb-sucking, by short-sample observation. He found that frequency of oral gestures was a relatively reliable trait, and seemed to be negatively correlated with *nutritional* status (as measured by the ponderal index) in children from 7 to 13 years. From 10 to 12 years overweight children also were high in oral movements, suggesting that decided deviation from the norm may cause adjustment difficulties leading to such nervous habits.

Levy (31) advanced experimental support for his ideas with a study on the oral reactions of puppies to sucking deprivation Six collie puppies were separated into three groups at 10 days of age. Two puppies called "short-feeders" were bottle fed using a free flowing nipple. Such a procedure should markedly increase their oral tension, if a drive to suck is actually present. Two "long-feeders" were fed from standard nipples and then allowed to suck to satiety on a finger. The remaining two puppies were left with the bitch. The short-time feeders (deprived of a normal amount of sucking) were observed to suck a great deal more than long-feeders on non-nutritive objects, including their own bodies. Finger-sucking tests, initiated during the experiment, also demonstrated a greater "oral tension" in the deprived group. It may be significant, however, that only the short-time feeders initially lost weight when placed under the experimental conditions. Levy brought them to the weight level of the long-time feeders during the experiment through supplemental feedings. However, the early stress (severe weight loss at this age, either as a symptom or a determinant, is often followed by death) may have been an important factor in the excess sucking behavior. More than a month after the experiment the previous short-time feeders were so much smaller than the other dogs in the litter that something other than genetic size variation may have been operating. At any rate, Levy concluded that the enforced insufficiency of sucking was the direct cause of the exhibited excessive sucking.

Ribble (42) also postulated a hunger for oral stimulation. She visualized sucking as satisfying three different aims of the developing organism (*a*) nutritional, (*b*) reflex stimulation of the respiratory system, and (*c*) tactile stimulation of the mouth. Davis (11) administered a questionnaire to 250 parents and found no reports of thumb-suckers among children fed on a self-demand schedule. This finding is in agreement with the idea that deprivation is an important cause. Jones (27) used a short sample technique to observe frequency of oral gestures in 25 high school boys doing mental arithmetic. Under such conditions all *S*s showed a marked increase in oral manipulation. This finding emphasizes that factors other than deprivation or erotic pleasure influence the occurrence of such behavior.

Sears (51) in his major survey of objective studies of psychoanalytic concepts concluded that at that time available data supported Freud's views that: (*a*) non-nutritional sucking was motivated by some drive other than hunger, (*b*) its independence from hunger could not be total, and (*c*) the effects of deprivation are similar to such effects with other drives. The data were declared insufficient to speak for or against any other points.

Roberts (45) studied the feeding habits of 15 thumb-suckers and 15 non-thumb-suckers during the first 7-8 months of life. He found a relationship between high incidence of finger sucking and low feeding time and concluded that Levy was correct in his view that the amount of time spent in sucking is the primary determinant of the habit. Montagu (33), on the other hand, reported that a single child that was suddenly switched from breast to bottle and back several times gave no overt signs of sucking frustration.

None of these studies used numbers adequate for confident interpretation. It should also be noticed that they all compare the effects of two or more fixed amounts of nutritive sucking. Under such experimental conditions, however, it would seem logical to conclude that frustration of a drive acquired from even a very limited early association of sucking with food reward caused excess or displaced sucking.

Davis, Sears, Miller, and Brodbeck (12) carried out a comprehensive study designed to tease out the innate and learned base of the sucking drive. The experimental conditions were as follows: Sixty healthy full-term babies were divided into three equal groups. For the first 10 days of life a baby was fed entirely by either a cup, bottle, or breast method, depending on the group to which he was assigned. The duration, surface area stimulated, and vigor of required feeding responses were lowest for cup fed, intermediate for bottle fed, and highest for breast fed infants. Measures were taken of five kinds of behavior: (*a*) response to a finger-sucking test, (*b*) amount of spontaneous oral activity, (*c*) general body activity, (*d*) crying, and (*e*) appetite. The only noteworthy difference between groups in measurements taken was the significant tendency for the breast-fed group alone to show an increasing responsiveness to lip stimulation (as measured by the finger sucking test) during the experimental period. One feature of the study is the fact that all infants that did not suck proffered finger within 5 seconds got a zero score. It is possible that occurrence or non-occurrence within such a short period would correlate very poorly with total time spent sucking in a longer test of a fixed duration. These workers concluded that the conditions of breast feeding (reward only follows vigorous sucking, and a greater number of sucks are rewarded) were conducive to a gain in habit strength. The fact that the cup-fed group did not behaviorally differentiate itself as an "orally deprived" group, or give evidence of other abnormalities deals what seems to be a crucial blow to any theory of an innate sucking drive. Freeden (15), in a study of the effects of cup feeding on new-born infants, substantiates this finding.

A learning theory interpretation, as an alternative, certainly seems feasible. There are other possibilities, however. If sucking is a drive, innate or otherwise, it is much like the sexual drive in that its satisfaction is not essential to individual survival if feeding takes place by other means. Some theorists advocate that such drives may be converted to quite different forms of behavior (sublimation), a thesis which would make interpretation or prediction in this area very difficult. Also, frustration of such drives can lead to a diminution of direct expression of the drive, rather than an excess. Nor have we reached a point where prediction of the type of reaction is possible. In this connection, of interest if the variability on the sucking test was significantly greater for the cup-fed group in the experiment by Davis *et al.*, since a tendency to give either very high or very low readings to deprivation could easily give an intermediate mean.

Kunst (28), in an extensive study of thumb and finger sucking during the first year of life, analyzed 28,000 short samples of behavior of 143 orphanage children. She defined non-feeding sucking as behavior in which the lips closed over any body part or non-nutritional object introduced into the mouth. The strength of this tendency in an individual was defined as the ratio of those periods in which non-nutritive sucking was observed to the total number of observations. Strength was found to be a function of the time elapsed after feeding.

The amount of non-feeding sucking also correlated positively with the liquid volume of the formula when other variables were held constant. This would seem to favor a habit-strength theory, but Kunst points out that large feeders may be subject to more pronounced hunger contractions. There was a slight tendency for infants fed on evaporated milk formula to suck less. This finding is not at variance with the hunger hypothesis, since evidence was cited that hunger contractions are delayed longer following such a diet.

Kunst favors a hunger basis for non-nutritive sucking. The data could, however, be adequately interpreted to favor any theory, and is mainly valuable as an accumulation of molar facts and tendencies giving promising leads for future research. Kunst realizes the design is not defensible as a rigid test of theory, and cautions that the sucking habit may be a response to a feeling of deprivation of other things than food.

Orlansky (36), in a review of the literature on infant care and personality, reacted to the various single factor theories with the caution that factors related to child-rejection shorten breast feeding, and factors favoring over-protection increase its duration. This "constellation" of correlated factors makes teasing out specific factors in the resultant behavior a complex matter He cites evidence that Levy's oral deprivation theory could only be a partial answer. Results of other studies indicate that oral deprivation need not result in habitual thumb-sucking and that thumb-sucking is not always attributable to oral deprivation. Orlansky's thesis is that no single-factor theory of the etiology of non-nutritive sucking can possibly cover available facts, and that deprivation, excessive gratification, normal sucking opportunity, and a host of unknown non-oral factors might all give rise to the same behavioral response under certain conditions.

Sears and Wise (52) analyzed data gathered from interviews with parents of children weaned to cup-feeding at various ages. They wished to test the hypothesis that "oral drive" is related to the occurrence of the instrumental act, sucking, followed by the goal response of eating. Categorizing infants by early, middle, and late weaning dates permitted a crude measure of the degree to which sucking could have attained secondary reward value. It was hypothesized that the vigor of frustration reactions was related to the amount of previously rewarding practice, rather than to early sucking deprivation. The data tend to support such a reinforcement theory. The higher average strength of frustration in later-weaned groups was taken as an indication that oral drive is strengthened by longer practice. These frustration reactions were not necessarily oral. When frequency and severity of thumb-sucking were contrasted between groups, no reliable level of significance was obtained. The greater tendency toward severe thumb-sucking at 2 years and 6 months in the late-weaned group seemed to refute early weaning as an important factor under these conditions.

Although this interpretation appears to contrast sharply with Levy's theory and findings, the authors attempt to reconcile his data with their own. Essentially, the argument is that Levy's findings do not really require the assumption of an inborn oral drive. Instead, his data merely indicate that infants rewarded by nutritive sucking have a sufficiently strong oral drive and that interference leads to substitute sucking. Levy's long-feeding puppies, however, would have experienced a greater number of instrumental acts (sucking) leading to reward (food). This fact in Hullian learning terms would seem to be of importance in building up secondary reward value. From this point of view, the puppy experiment still seems to give data at variance with the learning theory analysis of Sears and Wise.

Brodbeck (9) reported an experiment in which he varied the size of nipple apertures (large and small) and the amount of milk (large and small) given to bottle-fed babies during the first four days of life. For the second four days the four experimental groups of nine infants each were cup fed.

The control *S*s (16) were bottle-fed for all eight days in routine manner. All four experimental groups showed a significant decrease in non-nutritive sucking when changed to cup feeding; the control group did not. In addition, the greater the food-reward, the more sucking responsiveness. Such findings support a learning theory interpretation rather than oral drive. Deprivation theories of thumb-sucking also suffer, if behavior samples taken this close to birth are a reliable index of later tendencies.

One finding in this study did partially parallel Levy's findings with puppies. The weak pressure group (large aperture nipple) did demonstrate more non-nutritive sucking *after feeding* than the strong pressure(small aperture) group. Although this could be interpreted in other ways, it was the only effect which could be attributed to an oral deprivation. Such an interpretation could not, however, clear up the problem of why the effect occurred only after rewarded feeding. A learning theory hypothesis based on reward would still seem most adequate.

Walker (55) carried out extensive observations of young calves for the first few days of life. He described the instinctive tendencies of calves to nurse in a specific manner, preferring to suck a finger held at udder level to a bucket of milk. It was also interesting that some of the calves which were bucket-fed developed a loss of hair around the mouth. Walker hypothesized that the wetting of the muzzle by the milk was the causative factor. He does not say whether the chemical composition of the milk or excessive licking of the milk-soaked area was responsible. It is possible that sucking deprivation could be a factor. This could be easily tested by wiping the milk away carefully after each feeding to see if the hair loss still developed.

Ross (47), in a pilot study, separated a litter of cocker spaniel puppies into mother-, bottle-, and dropper-fed groups for the first two weeks of life. Puppies were weighed each day, and non-nutritional sucking was measured by finger-sucking tests, sucking pressure tests, and observations of samples of daily activity. Considerable difficulty was experienced in keeping puppies alive under these conditions. While the data are meager, they supported Levy's notion of a sucking need over and above the nutritional needs of the animal. Bottle- and dropper-fed puppies evidenced equivalent amounts of non-nutritive sucking, while those left with the bitch showed a great deal less. Since the weight curves were similar between groups, variations in nutritional status did not seem to be a significant factor.

Ross (48) also separated puppies from the bitch at two, three, four, and five weeks of age for two-week periods. Measures were taken as in the previous experiment. Both overt sucking of body parts of littermates and finger sucking were more pronounced in the experimental puppies. Levy's results were thus confirmed on another breed. A greater tendency to non-nutritive sucking in the three-week group was of interest in terms of a critical period interpretation.

Yarrow (57) studied thumb-sucking in relation to previous nutritive sucking experience in 66 children. Severe reaction to weaning was found in later rather than in the earlier weaned children. The severity and duration of thumb-sucking was related to the amount of time per feeding during age one to six months. The shortest feeding time was found to be associated with the severest and most persistent thumb-sucking.

Bernstein (6) selected 50 children at random from a well-baby clinic. His results indicate that a reinforcement rather than a deprivation point of view more clearly explains the strength of oral drive. Sucking deprivation was not implicated as the causative factor of thumb-sucking.

Among other things, it was concluded that there was a direct relationship between the amount of reinforced sucking during infancy, and the tendency to be constipated. An inverse relationship was also shown between sucking reinforcement and "hoarding behavior" in later childhood.

In a recent investigation James (26) was especially interested in the effects of satiation on the sucking response in puppies. Puppies, between the ages of one and 21 days, were separated from the bitch for an interval during which milk was injected into the stomach. Then the puppies were returned to suck. There were no differences in sucking time, milk intake, or general behavior in the experimental and control groups. James concludes that the amount of milk in the stomach has little effect on eliminating the sucking response.

The non-similarity of subjects, conditions, and experimental methods in the variety of studies we have just discussed undoubtedly contribute a great deal to the variability and seeming contradictions among the findings. It seems clear that better controlled experiments are required before many of the questions can be clarified.

The weight of evidence inclines toward the conclusion that the strength of the sucking response in new-born infants is increased by learning and habit formation and thus affected by a secondary drive. The possibility that an innate oral drive also exists is not ruled out, and, indeed, there must be some primary response to stimulation so that sucking can be originally initiated. The new-born human infant readily adapts itself to various ways of feeding. This is not the case in some other animals, and it is possible that innate and experiential factors have a different relationship in other species. The most important experimental question is whether or not frustration (of either an innate or acquired drive for oral activity) has an important effect on behavior. Most of the data agree that severe frustration increases thumb-sucking, but whether it affects later behavior is still in doubt.

D. The Problem of Artificial Feeding

Studies cited in the second part of this paper concerned the sucking response as a specific variable. They represent an attempt to determine the effect on the organism of variations in the amount or temporal occurrence of nutritional sucking. Many of them were well controlled studies, even though between-study variations in conditions were great. When one starts to navigate in the sea of factors involved in the problem of breast versus artificial feeding, however, the number of uncontrolled variables seems at times to be overwhelming.

In 1929, Hoefer and Hardy (24) published a large-scale study on breast and bottle feeding. Analyzing the infant feeding history of 383 elementary school children, they correlated various mental and physical tests with length of breast feeding. Their general conclusion was that artificially fed children were on the average mentally and physically inferior to breast-fed children. The relationship was not simple. Children breast-fed from four to nine months obtained the highest average intelligence scores and the better physical ratings. Children that had been breast-fed beyond nine months showed progressively lower scores.

It cannot be overemphasized that such findings leave many factors uncontrolled. Parental attitudes, home environment, etc., may covary with duration of breast-feeding and be of greater causative significance.

Faber and Sutton (14), in a study of 138 children, reported that any initial advantage of breast-feeding may be quite temporary. Although the breast-fed infants had a higher mean growth rate in the first three months, the tendency was reversed in the remaining months of the first year. Resistance to infection was greater in the artificially fed group during most of the first year. Weaning after the third month was not only found to be non-deleterious, but of possible advantage, other things being equal. This study attempted to equate non-feeding variables, and is thus more apt to mirror effects of breast vs. bottle feeding, *per se*, than most of the others.

Rearson (41) collected data in good agreement on a behavioral level with the Hoefer and Hardy study. He found that children breast fed less than six months or more than 10 months were more maladjusted at school and displayed timidity and nervousness with greater frequency than children breast fed from six to 10 months. Childers and Hamil (10) reported a lower incidence of abnormal behavior traits among children breast fed less than one month or more than five. It is interesting to note that the three studies cited above agree roughly on the most favorable age for weaning. The weaning ages recommended are as follows: four to nine months (Hoefer and Hardy), six to 10 months (Rearson) and over five months (Childers and Hamil).

Rogerson and Rogerson (46) traced 109 children who had been observed as infants. At the age of seven years those children who had been artificially fed were more apt to sleep and eat poorly, and suffer from enuresis, fears, and nervousness. These workers suggest a positive correlation between artificial feeding and later psychological difficulties, but warn against uncontrolled factors.

A summary of Ribble's articles (42, 43, 44) might best fit in the previous section, since she makes many points about the drive status and functioning of the sucking response. Her over-all thesis, however, would seem to be that breast-feeding by a loving mother figure can best serve the multiple needs of the infant. Such a viewpoint would ordinarily raise not the slightest ripple. It is the reasoning and evidence she used to advocate the near-absolute necessity of large quantities of sucking, mothering, etc., that brought forth aggressive criticism from Orlansky (36) and Pinneau (40). Ribble views the human infant as so physiologically and anatomically "unfinished" that it becomes functionally disorganized if inadequately stimulated by a mother figure.

Her evidence that the circulatory, respiratory, and digestive systems of the infant are inadequate to their job is attacked point by point by Pinneau

(40). Her evidence for the necessity of sucking is also easily countered by studies such as that by Davis *et al.* (12), which indicated that cup-fed infants not only survived, but seemingly gave no evidence of frustration or disorganization. Orlansky (36) cites anthropological evidence that extreme cases of cultural tendencies to minimize infantile stimulation do not seem to impair the physical or psychological growth of children. About the only thesis which was left unchallenged is that the human infant does require *some* form of feeding and care (36).

One caution is definitely necessary, however. Although Pinneau and Orlansky correctly question the basis for Ribble's assertions, it by no means follows that factors she favors, such as the superiority of breast-feeding, a drive status for sucking, or the lasting effects of infantile experience may not be defensible on other grounds. The validity of such hypotheses remains to be tested.

Peterson and Spano (39) correlated duration of breast-feeding with aspects of the child's personality and found no significant correlations. A side finding was that duration of breast-feeding is not related to maternal rejection, an important fact, if valid.

Maslow and Syilagyi-Kessler (32) a relationship between results of a test of insecurity-security and the length of breast-feeding. The highest security scores were obtained by the group not breast-fed (or breast-fed very little), and by those who were breast-fed for over a year. This is a finding at variance with most of the others and would indicate a critical period for weaning trauma if it were possible to deal with single factors.

Bakwin (4) stressed the importance of breast-feeding in one of the many non-experimental articles which have been written on this subject. The naturalness of breast-feeding was emphasized, as well as its relationship to the emotional and psychological needs of the infant and mother. Leitch (29) regards the following character traits to be related to the duration of breast-feeding: optimism or pessimism, impatient importunity, voluble speech, ambition, haste, restlessness, envy, gluttony, etc. Articles of this type, either for or against the superiority of breast feeding, are not particularly useful for resolving the problem, no matter how rational the arguments.

Goldman (17, 18, 19) attempted to validate the linkage between early feeding history and later personality. In the first article (17) the theory of the oral character is tested. According to psychoanalytic theory, the orally gratified type is distinguished by an imperturbable optimism unaffected by reality experience. The orally deprived type, on the other hand, is characterized by an exeedingly pessimistic outlook on life. Nineteen traits were tested by means of rating scales, using 115 adult subjects. All scales were checked regarding reliability and validity. Reliability coefficients ranged from .90 to .56. Correlation between persons with a statistically derived "standard type" was carried out by use of Burt's simplified type factor analysis. A bipolar distribution was indicated, seeming to verify the psychoanalytic prediction of a two-fold personality scale with pessimism, passivity, aloofness, oral aggression, etc., at one end and optimism, nurturance, and sociability at the other. No linking of these traits with early experience was done.

In the second study (18) Goldman tested two hypotheses: (*a*) that the shortening of the period of breast-feeding, i.e., early weaning, is more likely to prove traumatic than late weaning, and (*b*) that an overlong as well as too short a period is traumatic. Infants weaned by four months of age were placed in an early weaned group; infants weaned after five months of age in the late weaned group. Data were secured on 100 adult subjects scored for oral pessimism by means of the verbal rating scales for 19 character traits. Information was obtained from the mothers of the subjects as to whether the child had been breast or bottle fed, and at what ages a change occurred. Analysis of variance techniques were used for determining differences in oral pessimism between the groups. A significant, but low, correlation was found between early weaning and oral pessimism ($r = .27$) and late weaning and oral optimism ($r = .31$). Thus a time factor may be important, but other factors are necessary. In the third paper, Goldman (19) summarizes her previous work and emphasizes their relationship to psychoanalytic thinking (51).

Orlansky (36) covered the breast and artificial feeding question in his review article. He concluded that there was no evidence that either breast or bottle feeding is inevitably the best method. He emphasizes that a careful evaluation of factors in the individual case should indicate the best method to be used in that case, but not in others.

Thurston and Mussen (54) have reported a study in which they correlated scores on the *TAT* with early feeding history. Predictions in accordance with psychoanalytic thinking were made concerning the effects of early oral frustration on adult personalities. The subjects were 91 male college students mainly from middle class families. Ten *TAT* cards were given as a group test to all *S*s, with five minutes allowed to write a story for each card. Psychoanalytic oral traits were translated into *TAT* variables, and various methods of grouping the *S*s as orally gratified or non-gratified were used. Out of 270 chi-square tests only nine were statistically significant at the .05 level. Of these nine relationships, only two were in the direction predicted by various psychoanalytic writers. The authors conclude that the results afford no support whatever for the oral personality concept. Although the study seems a significant one, a precariously weak chain of assumptions underlie the argument. First, it is assumed that the stories mirror the *S*s' own needs accurately, that such a small behavior sample is reliable, that the psychology students are heterogeneous enough in background so that an appropriate sample including extremes of non-gratification is included, and finally that translating traits to *TAT* variables reflects the trait. The most frequently postulated trait to be derived from oral non-gratification is pessimism. The *TAT* variable to which this was equated is "Blame-avoidance," defined as a fear of reproach, blame, and punishment. There are some individuals who would question the similarity.

Sewell (53) gathered early training information on 162 farm children and by a chi-square technique determined the association between infant training practices and each of 46 personality indicators. All *S*s were termed either high or low on the traits used, and were also placed in one of two categories on early training practices. On the question of bottle- versus breast-feeding no significant differences in any of the 46 personality traits was found. In fact, the analysis gave no basis for rejecting the general hypothesis that the personality adjustments and traits of children who have undergone varying infant training experiences do not differ significantly. Sewell closes with an admirable summary of the hazards of early generalization from his study or any previous ones. He emphasizes important points that must be systematically studied before any conclusion about the importance of infancy can be made, and stresses that the crucial factors may not be training practices themselves, but the whole personal-social situation in which they find their expression.

E. CONCLUSIONS

This review has attempted to deal with the phenomenon of sucking behavior and with the relationships of this behavior to later behavior. The mechanics of the sucking response, the significance of sucking experience, and the problem of artificial feeding were considered. Selected papers and reports on this area were described and evaluated with a view towards integration of the available evidence. Extreme difficulties were met in interpreting the results from studies in which different subjects, conditions, and methods have been used. As Beach and Jaynes have said: "Anatomical differences, nutritional requirements, sensory sensitivity, motor development, and previous experience are closely interwoven variables with age, and cannot usually be controlled independently of each other" (5, p. 257).

In general it can be said that sucking is an important behavior trait of mammals, being necessary for survival in most and forming part of the early experience of all normally reared individuals. Its biological importance is obvious, but its psychological significance is still an open question whose answer is a problem for both comparative and human psychology. The kind of answer given may in part depend upon the species studied, and the available data suggest a number of specific problems.

1. Is sucking a simple reflex which can be conditioned or is it from the first a highly organized pattern of behavior? This problem has been thoroughly studied in human infants and it appears that sucking and swallowing movements form a chain of reflexes but that other reflexes such as orientation and manipulation tend to be more or less independent.

2. Is there an internal drive for sucking or is it simply a reflex depending on external stimulation and for which a secondary drive can be developed? Results with human infants indicate that sucking can be increased by reward training, but the possibility that there is also a primary internal drive still exists. There is almost no evidence on this point in other animals.

3. Are there hereditary differences in sucking behavior and its supposed drives? The human evidence indicates that there are consistent individual differences in sucking behavior and it is reasonable to suppose that these are at least partly produced by heredity. However, the point has not been experimentally demonstrated.

4. What is the relation between hunger, the state of nutrition, and sucking? There is little evidence on this point, since most experiments on babies have involved well fed individuals. There is every reason for supposing that hunger affects sucking. In an experiment with well nourished puppies, however, the fullness of the stomach had no apparent effect upon the sucking.

5. What is the effect of maturational development on sucking? Very little information exists on this point. Most of the experiments have been done with new-born human infants and there has been no repetition of comparable experience at later ages. On the other hand, the evidence indicates that weaning may produce a better effect on behavior at certain times than others, and this is possibly related to maturation.

6. What is the effect of sucking frustration? This question is independent of whether a primary or secondary drive is involved. There is considerable variability in the results reported for human infants but the weight

of evidence is in favor of the conclusion that sucking frustration may increase the amount of thumb-sucking. Limited experimental results with puppies support this conclusion.

7. What is the effect of sucking experience on later behavior? The evidence here is mostly based on tests and case histories of children which have been artificially fed, usually by sucking on a bottle as opposed to those which are breast fed. There is some positive evidence that differences in later behavior may exist, but so many factors are uncontrolled and the general emotional situation may be so complex that it is difficult to draw any conclusions.

8. What is the effect of nursing on the mother-child social relationship? The experience of the mother may have an effect upon her behavior and attitude toward the child as well as affecting the child in its attachment to the mother. Little evidence is available on this point.

In general, we may conclude that these are a series of important problems which are difficult to work with in human children because of the difficulty of controlling the various variable factors involved. They are, however, problems which can be approached experimentally with animals where heredity, environmental factors, maturation, and motivational factors can be manipulated with better control. There is still a lack of basic information on any species of animal, and a systematic study is needed which will vary such factors as time of weaning, food intake, nutritive and non-nutritive sucking opportunity, etc., among a large population of experimental subjects. Such a study on puppies has been initiated and will be reported in a later paper.

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AN INVESTIGATION OF BAR-PRESSING UNDER CONDITIONS OF FIXED-RATIO AND CONTINUOUS SECONDARY REINFORCEMENT*

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A. INTRODUCTION

It is presently assumed that organisms learn even though incentives bear only a learned relationship to the satisfaction of tissue needs and are not invariably present as a consequence of some response. While modern reinforcement theorists have recognized the importance of the phenomenon of derived reward (e.g., 4, 11, 12) and have attempted to reconcile the facts of intermittent reinforcement to their theoretical orientation (e.g., 9, 10), they have elaborated their explanation of learning for the most part from experiments involving continuously reinforced primary drives. Before extensions of such theorizing, particularly to the human level (7), can be seriously accepted, it must be empirically demonstrated that secondary reinforcement has the same properties as primary reinforcement—and this would be especially important with reference to the question of partial occurrence. Accordingly, it was the aim of the present investigation to examine the relative effectiveness of continuous and intermittent secondary reinforcement upon a previously non-reinforced bar-pressing response. Should secondary reinforcement be essentially like primary reinforcement, it is to be expected that subjects on an intermittent (fixed-ratio) schedule will execute more responses in a fixed period of time than those receiving reinforcement after every bar press.

B. METHOD

1. *Apparatus*

The animals were tested in one or the other of two Skinner boxes, 10 x 9 x 8 inches, with "*T*"-shaped removable bar inserted about three inches, approximately four inches above the floor. A feeding cup and tube replaced the bar on those sessions not requiring pressing. Water was always available on the side opposite the bar.

The secondary reinforcing agent was a 7.5-watt light bulb, four inches

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above the bar, flashed for two seconds. Primary reinforcement was provided by ⅛″ square (.06 gm) pellets made from Purina Chow. Both light presentations and bar presses were recorded on a Gerbrand's four-channel polygraph.

2. *Subjects*

Forty albino rats, inbred from Wistar stock, 80-120 days of age at first test. All were housed individually.

3. *Procedure*

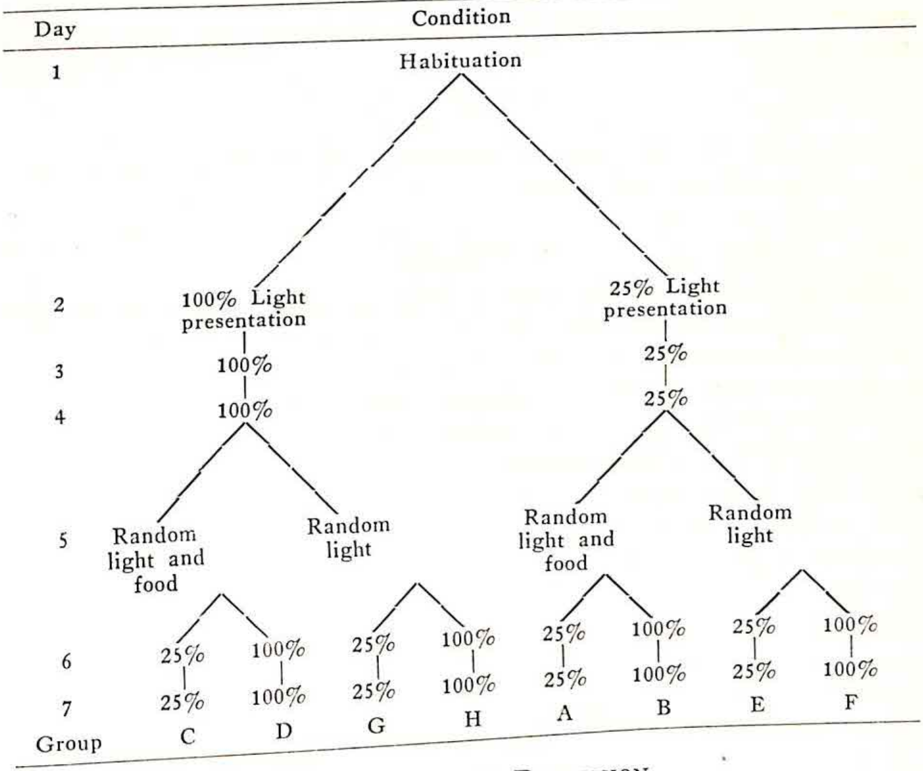
After 10 days on a feeding regimen (food available for one hour of each 24), each animal was allowed a 55-minute habituation period with feeding tube and cup containing 10 pellets present, but bar removed. On three succeeding days operant level was recorded. During these 55-minute periods, tube and cup were removed and the bar was presented. For one-half of the animals a flash of light followed every press, for the other half, it followed every fourth press. Training was given on the fifth day. It consisted of 100 randomly-sequenced presentations of the light followed after one second, for half of each group, by delivery of a pellet into the food cup. The final two days involved again measuring operant level. During these sessions the groups were further subdivided such that half of each training group received continuous and half intermittent reinforcement.

There were thus, at completion of data-collecting, eight groups of five animals each. Table 1 presents an outline of the design. Three animals of each group were run in one box and two in the other.

The mean number of presses for the two days preceding the training session was subtracted from that for the two post-training days to yield an average gain score for each animal. Such a score indicates the superiority or inferiority of the animal's performance over its pretraining level. The average gain scores were then subjected to a quadruple classification analysis of variance in which the main sources were: (*a*) training vs. no training; (*b*) type of pretraining light-presentation schedule (every trial vs. every fourth trial), (*c*) type of post-training reinforcement schedule (continuous vs. intermittent), and (*d*) Box 1 vs. Box 2. Indication of the establishment of secondary reinforcing properties for the light is a significant training vs. no-training source of variance, of the predicted superiority of intermittent secondary reinforcement is a significant training by post-training schedule interaction.

TABLE 1

OUTLINE OF THE EXPERIMENTAL DESIGN



C. RESULTS AND DISCUSSION

Table 2 presents the average gain scores for each of the training and no-training groups. Examination of these data clearly indicates that animals experiencing food-following-light subsequently display a greater rate of responding than those not allowed such experience. Indeed, the latter shows a drop-off in rate. This is borne out by statistical analysis (training vs. no-training $F = 6.55$, $df = 1/24$, $P < .05$). Meanwhile, none of the remain-

TABLE 2

AVERAGE GAIN SCORES FOR THE SEVERAL TRAINING AND NO TRAINING GROUPS

(N in each case = 5)

Training group	Score	No training group	Score
A	63.5	E	—87.5
B	11.3	F	—55.0
C	33.7	G	— 5.9
D	5.1	H	—83.9
Av.	28.40	Av.	—58.08

ing sources of variance, including the crucial interaction, were found to be reliable. Thus, our data fail to support the expectation that the effectiveness of a secondary reinforcer would actually be enhanced by its intermittent presentation. On the other hand, contrary to the classical law of effect, there is no evidence that secondary reinforcement has been reduced in effectiveness by virtue of its application on only a portion of the trials.

The finding that light acquires reinforcing properties supports the results of other studies of this type (e.g., 1). In this connection it may be noted that the trained subjects appear to have met Maier's (6) criterion of reasoning, for they seem to have combined the experiences (*a*) of pretraining bar-pressing and (*b*) of light-food combinations to effect an increased number of post-training responses. Further, this situation meets the conditions of the inference postulate of MacCorquodale and Meehl (5) and the data confirm their prediction.

Negative results, however, demand some rationalization. We have several alternatives. First, we may choose to believe that lack of difference in effectiveness of intermittent and continuous reinforcement indicates some basic difference in the nature of the primary and secondary reinforcement mechanisms. Since this conclusion lacks both theoretical and independent empirical support, we are prone not to accept it.

Secondly, the differential effect may have been confounded by the schedule of light presentations. Animals, irrespective of their training status, receiving intermittent presentation either before or after training, made more presses than those receiving light for every response. The relevance of this for the possible operation of a curiosity (2, 8) or manipulative drive (3) in learning requires further study.

Finally, the expected differential effect could possibly have been demonstrated with larger groups, different amounts of habituation and training, and/or a different schedule of intermittent reinforcement.

D. Summary

Strength of a bar-pressing response was determined for conditions of fixed-ratio and continuous secondary reinforcement. Forty albino rats served as subjects. After a period of habituation to one or the other of two boxes, three 55-minute periods of pretraining experience with the bar were provided each animal. A two-second flash of light followed every press for some animals but only every fourth press for others. Training for half the animals consisted of 100 presentations of light, with bar removed, each followed by a food pellet. Post-training experience involved two additional

55-minute periods with the bar present. For these sessions, half of each training group received intermittent and half continuous light presentation. Average gain scores derived from comparing bar-pressing activity for the last two pretraining periods with that for the post-training periods, were subjected to an analysis of variance in which the main sources were: (*a*) training vs. no training, (*b*) type of pretraining light-presentation schedule, (*c*) type of post-training light-presentation schedule, and (*d*) boxes. The results of this analysis indicate the trained subjects to show reliably greater gains than the untrained, suggesting that the light had acquired secondary reinforcement properties. Level of bar-pressing activity in animals receiving intermittent secondary reinforcement, however, was not found to differ from that observed in those receiving continuous secondary reinforcement.

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DEVELOPMENTAL TRENDS IN PRE-ADOLESCENCE AND IN EARLY ADOLESCENCE IN SELF-EVALUATION*

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A. INTRODUCTION

Persistent study of personality poses numerous and complex problems. Yet, if development of a person's personality is to proceed in the direction of wholesomeness, analysis must be made, and guidance and direction offered during childhood and adolescence. Many, though not all, cases of warped personalities can be traced to the childhood days of the maladjusted adult.

Friedlander (16), after studying the personality development of children who later became psychotic, is of the opinion that "certain characteristics in the home background and early emotional development . . . may account for the disorders." In fact, in 55 per cent of the cases she found definite evidence of gradually increasing maladjustment of personality throughout childhood and adolescence.

Havighurst, Robinson, and Dorr (17) maintain that the "environment of the child has a great effect upon the ideal self." They express a similar opinion when they state that "individuals in the child's environment influence his ideal self, especially if they are young adults." They conclude: "The inference is clear that schools, churches, and youth-serving agencies influence the ideals of youth as much or more through the presence and behavior of teachers, clergy, and youth-group leaders as through their verbal teachings."

"What is needed," writes Anderson (9), "is a much more complete approach to the problem of persistent and fluctuating traits and characteristics with an analysis of all data in terms of span of time. When this is done we will locate the factors that produce modifications and find that change is orderly and consistent. . . . By locating in the stream of stimulation and response the recurring factors which are subject to control, we will be able to guide the process of growth and development more effectively and improve the adjustment of all children. We not only need to know how to create a good environment for children; once created, we need to know how to maintain it."

As he points out, the child's "personality becomes organized around nodal

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points or experiences which have received particular emphasis and much reiteration." After enumerating some of these factors, he affirms that the child "is not a simple passive creature molded exclusively by external forces; he is very much a creature in his own right, moving through his own experiences and creating his own world. This is not to deny the value of nurture in creating the best possible world for children, but to plead for a study of the child as he is rather than to use him as a convenient locus for images which fit adult conceptions and convenience."

Adler (1) raises a plea for better evaluation of all material collected for the guidance of the child. Cattell (14) has shown that major life events produce simultaneous readjustments in several personality variables and also that "beyond the primary ergic factors there are second-order factors." Tryon's study (20) of personality during adolescence indicates a "marked tendency for self-mention to decrease as age increased." McQuitty (18) makes the definition of personality integration meaningful as he shows its implications in relationship to the concept of self. Bonney (12, 13), studying the relationship of sociometric scores to personality self-ratings and the relative stability of the several variables, found the scores fairly constant. These and numerous other studies including those of Evjen (15), Anderson (8), Argelander (10), Winslow (21), and Precker (19) all point to the significance of the early development of a well-adjusted personality. Self-knowledge is essential to improvement in personality. More research on the adolescent and pre-adolescent's evaluation of self will help to illumine the problem.

B. Purpose of the Study

The present investigation of the adolescent and pre-adolescent self-concept was undertaken for the purpose of facilitating the understanding of today's youth in these age brackets. The study seeks to analyze developmental trends in a number of independent personality variables as evaluated by the self in pre-adolescent and early adolescent boys and girls. Specifically, the experiment seeks to ascertain whether or not there be observable trends in age-level development for boys or for girls during pre-adolescence and through the years of early adolescence.

C. Method of the Study

The *Child Personality Scale* (2, 3, 4, 6, 7) was administered to 500 children in several public and private schools in the Midwest. Participating in the study at each age level, 9 through 13 years, were 50 boys and 50 girls. The *Child Personality Scale* permits of ratings on each of 22 personality variables on a 10-point continuum. The measuring instrument as well as the meaning of the numbers from 1 to 10 were explained to the children. Hereupon each individual was asked to evaluate himself on each of the 22 scales.

D. ANALYSES OF DATA

Data were analyzed both by sex and by age level for each of the 22 scales separately. The results in terms of means for individual personality variables are shown in the accompanying figures. To facilitate interpretation, all computed means were multiplied by 100

Scales for energy and pep, intelligence, sociability, generosity, nervous-calmness, coöperation, popularity, and entertaining are depicted in Figure 1. In this figure it will be noted that developmental trends do occur in self-evaluation on some of the personality variables. An over-all view of the self-evaluation portrayed in this figure reveals a general downward trend from the 9-year-olds to the 13-year-olds. This holds true for both sexes in the graphs on the right half of the figure, namely, for intelligence, generosity, coöperation, and entertaining. In the scale for energy and pep, the trend is in the opposite direction. As the pre-adolescents emerge into adolescence, the self-scores rise.

For the scales measuring sociability, nervous-calmness, and popularity, one notes again a general downward trend in self-appraisal, with the exception of a unique feature in boys' scores of a rise to the 11-year level followed by a drop to the 13-year level. This is not the case with the 11-year-old girls. This same phenomenon was noted by Ausubel, Schiff, and Gasser (11) in their graph for "perception of own status" which indicates a rise from the age of 9 years, with a peak at about 11 years, followed by a decline to the 13-year level.

In the self-evaluation by girls there appears in all these eight personality variables a moderate, though decided, rise in self-opinion at the 12-year level followed by a drop at the 13-year level. A further study of these young adolescence would be warranted to ascertain possible causes of these developmental differences.

A somewhat different picture is portrayed in Figure 2. Though one observes again the rise in ratings for self-evaluation of girls at the 12-year level, in most of the scales one notes a drop in the boys' self-evaluations at the 12-year level. The opposite holds true at the 13-year level. Here there is a drop in the self-ratings of girls, considerably so in several scales, and a rise in four of the scales for boys at the same age level. On the other four scales, boys' self-evaluations are either the same or slightly lower than they

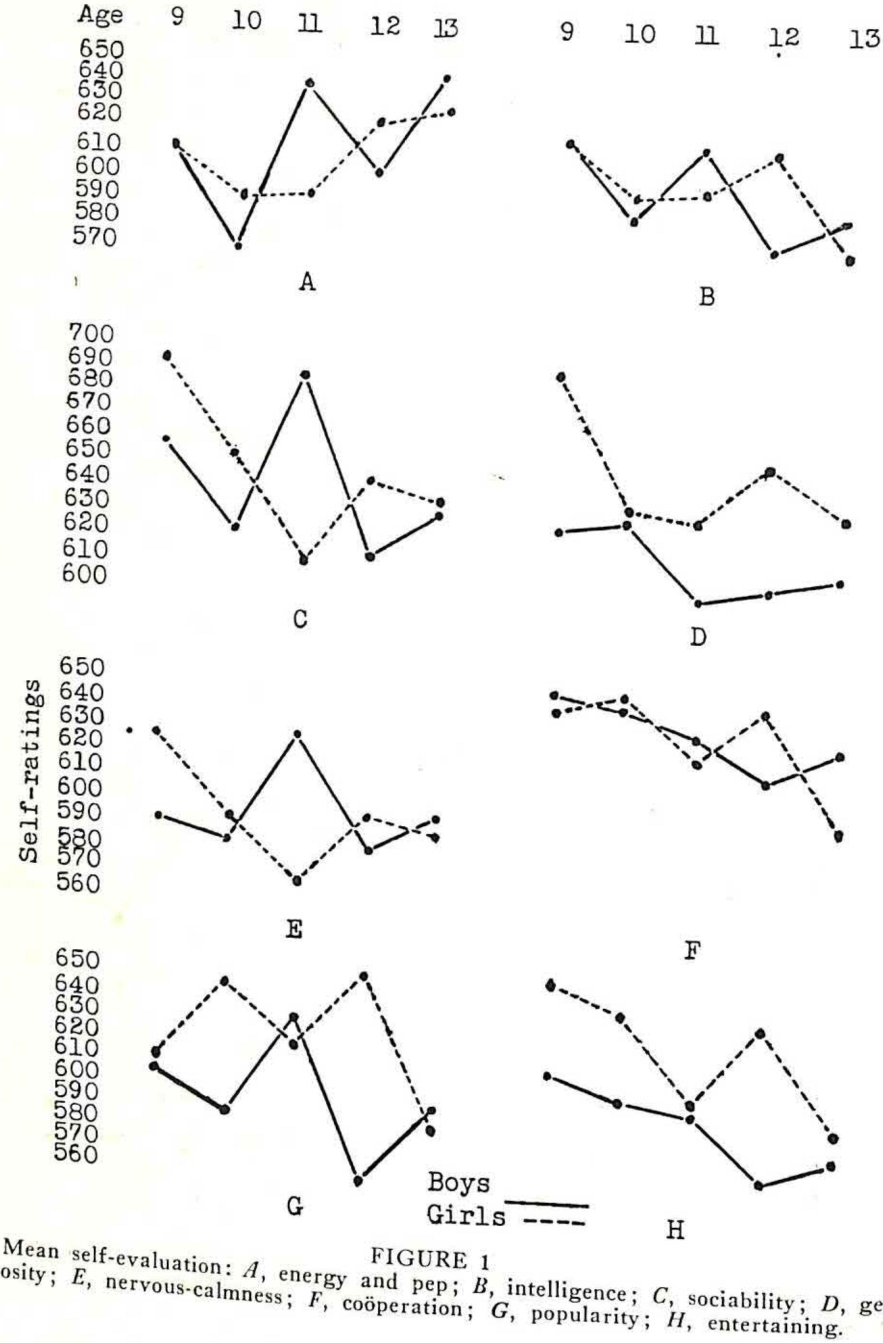

FIGURE 1
Mean self-evaluation: *A*, energy and pep; *B*, intelligence; *C*, sociability; *D*, generosity; *E*, nervous-calmness; *F*, coöperation; *G*, popularity; *H*, entertaining.

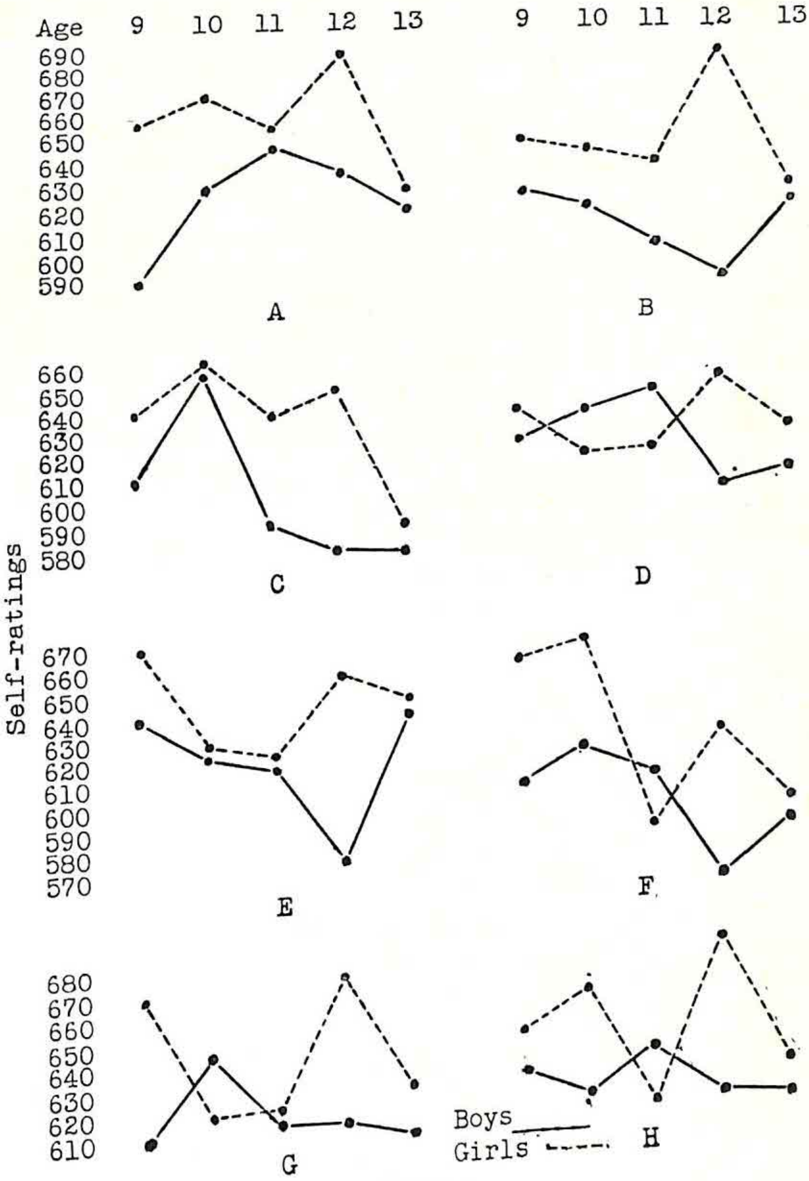

FIGURE 2
Mean self-evaluation: *A*, punctuality; B, disposition; *C*, courtesy; *D*, good sportsmanship; *E*, honesty; *F*, patience; *G*, sense of humor; *H*, dependability.

were at the 12-year level. Another point of interest is the general downward trend of ratings in many of the scales from the 9- and/or 10-year level to the 11-year level. At all age levels in the four scales, namely, punctuality, disposition, courtesy, and honesty, and at most age levels in the remaining four scales, namely, dependability, sense of humor, patience, and good sportsmanship, the self-evaluations of the girls are clearly above those of the boys.

The mean self-evaluations given in Figure 3 are for scales on neatness, interests, religiousness, persistence, boisterous-quietness, and thoughtfulness of others. Each of the graphs in this figure presents a picture somewhat different from those in the preceding figures. In all cases and for both sexes, except for the boys on the last-named scale, the highest ratings are those at the 9-year level. Self-evaluations are lower at the 10-year level and, in most cases, still lower at the 11-year level. Following this one notes developmental trends again indicating in most variables a rise in self-opinion.

Most conspicuous in this group of personality traits is the large drop in self-opinion among boys on the scales for religiousness and for persistence. One wonders why there should be so large a drop, 103 points for religiousness and 101 points for persistence, from the 11-year-old to the 12-year-old boys. This is not evident in the girls' self-ratings. On the contrary, girls' ratings show a slight rise between these two age levels. One also wonders why the girls' self-evaluations are so much and so consistently higher than are those of the boys on the scales for neatness and for religiousness at all age levels.

A few over-all observations on all three figures collectively are also important for brief consideration. There is more shift in mean ratings from scale to scale evidenced in the self-evaluations of the 9-, 10-, and 11-year-olds than there is in those of the 12- and 13-year-olds. This seems to hold true for both sexes. Another point of interest is noted in the fact that on all scales, save two, the sexes come closer together in their ratings at the 13-year level. It would be interesting to carry this study on into subsequent year levels to note whether or not this proximity between boys' and girls' ratings maintains.

In an earlier study (5), the present writer analyzed children's self-appraisal at various grade levels. While not directly comparable, in as much as the present study was based on age-level groups, some comparisons of preadolescent and early adolescent's evaluations today with those of children of a decade ago may be interesting. In the earlier study there was a distinct tendency for the boys to under-rate themselves. The amount of under-

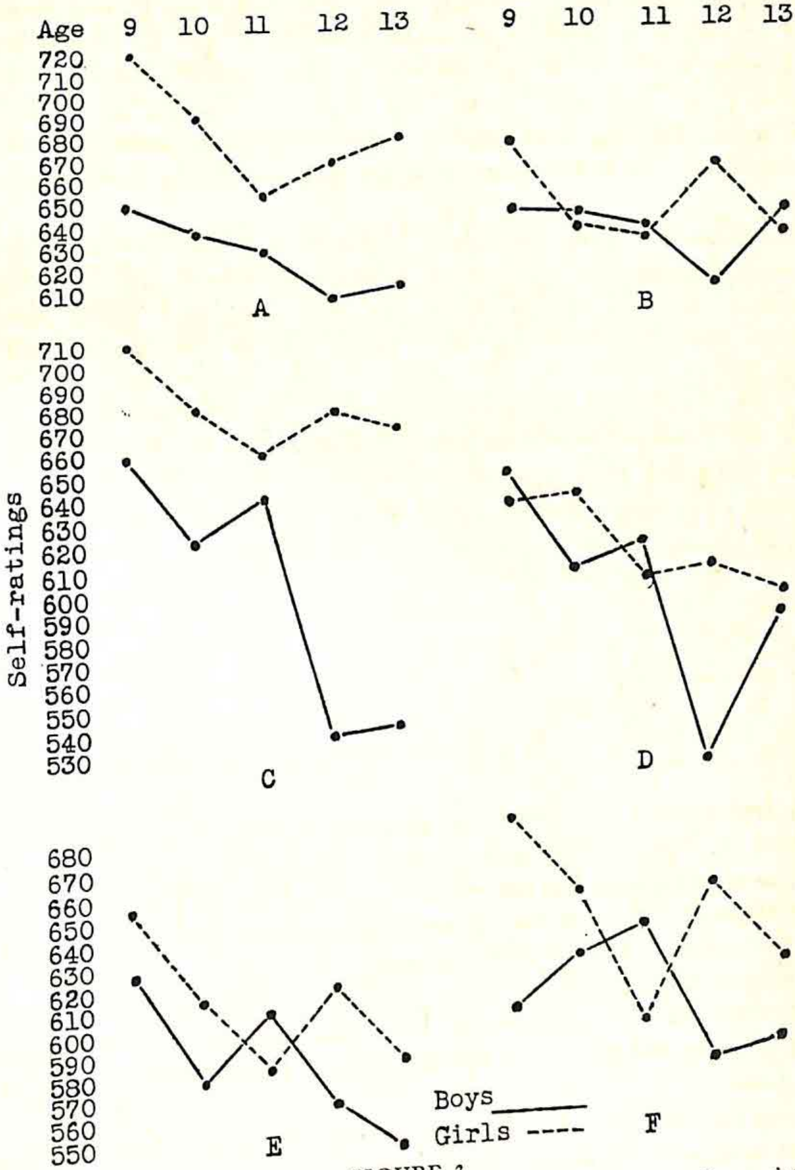

FIGURE 3
Mean self-evaluation: *A*, neatness; *B*, interests; *C*, religiousness; *D*, persistence; *E*, boisterous-quietness; *F*, thoughtfulness.

rating decreased at each grade level from the fourth through the eighth grades. If the former grade levels and the present age levels are in any way comparable, it would seem that almost the opposite is true today. In nearly all the scales there is more of a downward progression until the twelfth year and then a rise to the 13-year level.

E. Conclusion

After one fashion or another, teachers everywhere are concerned with evaluation in the classroom. While this evaluation is frequently limited to ability to learn and achievement in learning, it is of vital importance for the teacher to evaluate his knowledge of his pupils. This cannot be complete without the knowledge of the child's own self-concept. If the self-concept of the pre-adolescent is such that it does not seem indicative of good mental health, something can be done before the child emerges into early adolescence and adolescence proper.

The present study shows that self-evaluation is possible at the lower age levels. It has revealed developmental trends during the five-year period, namely, from 9- through 13-year age levels on 22 personality variables. It has revealed differences in these developmental trends between the sexes and among the five age levels studied. With more widespread experimentation on the self-concept of adolescents and pre-adolescents, one should come to a better understanding of children and youth at these age levels. As the findings of research become more widely circulated among teachers, its results can and will function in the classroom.

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SOCIEMPATHIC ABILITY IN A GROUP OF INSTITUTIONALIZED DELINQUENT BOYS*

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A. THE PROBLEM

Recently, a particular type of social perception, called sociempathy, has been introduced to the literature by Ausubel and his colleagues (1, 2, 3). These studies are part of a growing body of literature dealing with the factors which appear to influence or distort an individual's perception of himself, others and objects within his environment (5, 6, 8, 9, 12, 13, 17, 20).

Sociempathy has been defined "as an individual's awareness of his own and others' sociometric status in a given group of which he is a member" (1). Ausubel and his associates have reported results indicative that (*a*) older children are more able to perceive sociometric relationships involving themselves and others than younger children (1); (*b*) the ability to perceive one's own sociometric status and the ability to perceive others' sociometric status were unrelated (2); (*c*) sociempathic ability was unrelated to ratings of personal adjustment (2); and (*d*) individuals with high sociometric status in the group were not significantly superior to individuals with median or low sociometric group status in the ability to accurately perceive own and others' sociometric status (3).

There seem to be two bases for questioning the generality and constancy of the findings above. First, the samples employed in the inquiries cited were drawn from a population of the University High School and were, presumably, above average in intelligence, personal adjustment, and socio-economic status. While there is no *a priori* reason for believing that the reported conclusions were primarily a function of characteristics unique to the samples employed, one does wonder whether such findings could be reliably generalized to dissimilar populations. Secondly, the authors present no data as to the length of time each individual had spent in the particular group. Is it possible that the longer one knows his associates, the more evidence is available upon which to base predictions?

This paper was twofold in purpose: (*a*) to compare some of Ausubel's

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major findings with results obtained from a sample drawn from a population of adjudicated delinquent boys, and (*b*) to examine the relationship between sociempathic ability and four variables including age, intelligence, group sociometric status, and length of stay within a training school cottage.

It was hypothesized that the perceptions of the delinquent, as compared to the non-delinquent, would tend to show more distortions and self-deception which may result from his own needs and the attitudes he holds toward the individuals in the group.

B. METHOD

1. *Sample*

The sample consisted of 30 boys who comprised one cottage unit at the training school. Twelve boys were white, 12 were Negro, and 6 were of Puerto Rican origin. Sixteen boys were Catholic, 14 were Protestant. The average intelligence of the group, as measured by the Wechsler-Bellevue, was 85 with a range from 68 to 104. The average length of stay in the cottage was three months with a range of two weeks to 9½ months.

Twenty-six boys were from homes where either the natural mother, the natural father, or both were missing; four boys were from intact homes. All boys came from low socio-economic backgrounds; 13 boys' families were receiving public welfare assistance at the time of their admission to the training school. The most common reasons ($N = 28$) for boys being committed to the training school were truancy from school and stealing. All boys had previously lived in high-delinquency areas of Manhattan, Brooklyn, and the Bronx, New York City. According to the institutional psychiatrist, boys had varying degrees of psychopathology.

2. *Procedure*

An attempt was made to replicate Ausubel's (2) procedure with one alteration: boys were tested individually by the investigator to insure that they understood the task assigned them. The investigator presented a column of names, representing each boy in the cottage, and asked boys to respond according to the procedure listed below:

> I would like to know how well you are able to tell how your cottage mates feel about you. When you have to do things together with people, it's nice to know how they feel about you, because then you know better how to act with them. No one besides myself will ever see the individual answers you give me, so don't be afraid to say what you really think.

1. In Column 1, I want you to give the names of the three boys in the cottage who you feel are your best friends. Give the name of your best friend first. Understand?

2. In Column 2, there is a list of all the boys in your cottage. Next to each boy's name you are to give a number from one to five. "One" means you do not want this boy to be your friend at all. "Two" means that you would not like to have this boy as a friend. "Three" means that you do not care whether or not this boy is your friend. "Four" means that you would like to have this boy as your friend. "Five" means that you would like to have this boy as one of your best friends. Any questions? Do you understand?

3. In Column 3, there is a list of all the boys in the cottage. Give a number from one to five next to each one to show how you think he feels about you. "One" means that you think: "This boy does not want me as a friend at all." "Two" means that you think: "This boy would not like to have me as a friend." "Three" means that you think: "This boy does not care whether or not I am his friend." "Four" means that you think: "This boy would like to have me as a friend." "Five" means that you think: "This boy would like to have me as one of his best friends." Any questions? Do you understand?

4. Column 4 also has a list of all the boys in the cottage. On this page I want to see how well you can tell how popular each boy in the cottage is, that is, how many boys in the cottage want to be friends with him. Next to each boy's name you are to give a number from one to five. "Five" means that you think this boy is one of the most popular boys in the cottage, that he is one of the boys with the largest number of friends. "One" means that you think this boy is one of the least popular boys in the cottage, that he is one of the boys with the fewest friends. "Three" means that you think this boy is just about in the middle of the cottage in the number of friends he has. "Two" means that you think this boy is between "one" and "three," that is, you think he has more friends than the boy to whom you give "one" but fewer friends than the boy to whom you give "three." "Four" means that you think this boy is between "three" and "five," that is, you think he has more friends than the boy in the middle but less friends than the boys you chose as "five." Any questions? Do you understand?

C. RESULTS AND INTERPRETATION

1. *Sociempathic Ability (Self)*

Ability to perceive one's own sociometric status was expressed: (*a*) as a total discrepancy score for each individual, representing the sum of the deviations of his predictions of how others would rate him from the actual ratings given him by these persons; (*b*) as a "right" score, representing the total number of times an individual predicted *exactly* how another person rated him. The same scoring system was employed by Ausubel (2, 3).

Discrepancy scores ranged from 53 to 19, a range of 34. Since each individual could be as much as four points in error for each of 30 predictions, the theoretical range of deviation scores ran from 0 to 120. The mean discrepancy score was 32.7 with a sigma of 9.75. Although Ausubel's group was larger ($N = 44$), he reported a similar mean and sigma of 28.2 and 8.3, respectively (2, p. 43) for his high school group. [Hereafter Ausubel's (3) high school group results will be called high school group.]

Was the high school student superior to the delinquent group in ability to perceive how others would rate him? The "*t*"-test was applied to the group means. The "*t*"-sum was 4.1 indicating that the high school group were significantly ($p. < .01$) superior in perceiving their own status.

a. Distribution of ratings. Table 1 shows the distribution of ratings and predictions for the two samples and the degree of divergence of observed from expected results expressed as a value of Chi-square. The high school data were drawn from (2, p. 43). This analysis shows that the delinquent group's ratings were markedly skewed in a positive direction and were significantly different ($p. < .01$) from the ratings of the high school group for both ratings of others and predicted ratings for self. There were no significant differences between groups for predicted ratings of others.

TABLE 1

PER CENT OF RATINGS IN EACH CATEGORY FOR DELINQUENT AND HIGH SCHOOL GROUPS

Type of rating or prediction	Sample	Rejecting			Accepting		X^2
		1	2	3	4	5	
Rating of others	High School	2	6	28	47	17	16.02*
	Delinquent	8	4	18	33	37	
Predicted ratings for self	High School	1	6	42	36	15	25.34*
	Delinquent	8	4	20	33	35	
Predicted ratings for others	High School	9	15	32	25	19	6.88*
	Delinquent	12	9	25	21	33	

*A Chi-square of 13.277 was significant at the .01 level of probability.

Several reasons might explain the positive-direction skewness of the ratings of others and predicted ratings for self: (*a*) the greater need among delinquents to perceive one's interpersonal relationships in terms of one's own needs for affection and attention, (*b*) the "halo effect," (*c*) the differences might be apparent and attributable to the presence of girls in the high school sample. Both Dymond (12) and Ausubel (2) have reported that girls appear to be superior to boys in sociempathic ability. It is possible that the presence of girls in the high school sample has hidden the trend toward positive-skewness among boys of the high school sample.

The lack of difference between the two samples for predicting ratings for others seems to suggest that this ability may involve a different process than the ability to accurately predict self-status. Perhaps there is more objectivity, less ego-involvement, in the former process.

b. Right scores. Right scores indicate the total number of times an individual predicted *exactly* how another person rated him. The obtained right score mean was 17.7 with a sigma of 5.4 for the high school sample. Among the delinquent group, the mean right score was 8.7 with a sigma of 3.1. The analysis of sample mean differences yielded a "*t*" of 28.2 which indicated that the high school sample was significantly (*p.* < .001) superior in the ability to perceive exactly how others rated them.

c. Consistency. The consistency of the sociempathic discrepancy scores was determined by correlating odd discrepancy scores with even discrepancy scores. The corrected coefficient was .796 for the high school sample (2, p. 43) and only .221 for the delinquent group. The performance of the delinquent group therefore showed significantly less self-consistency than the high school group.

2. *Sociempathic Ability (Others)*

Ability to perceive the sociometric status of others was expressed by the total discrepancy between all individual predictions made by a subject of the sociometric status of others and the actual sociometric status scores of the latter. An individual's sociometric status was ascertained by taking the mean of all the sociometric ratings he received from others.

Discrepancy scores ranged from 7 to 37 for the delinquent group as compared to 21 to 49 for the high school group. The obtained mean discrepancy score for delinquents was 25.03 with a sigma of 7.20. The obtained mean discrepancy score and sigma in the high school group were 31.1 and 6.5 respectively (2, p. 47). The "*t*"-test was applied to these group means and "*t*" was found to be 8.74 which indicated that the delinquent group was significantly (*p.* < .001) more accurate in the ability to perceive the sociometric status of others than the high school group.

That the delinquents were more accurate and sensitive in predicting the status of others might be explained by: (*a*) greater sensitivity and need among the delinquent to know the status (peck order) of others in his group; (*b*) factors within the delinquent group such as greater reality testing, greater opportunities to observe overt demonstrations of how others actually behave toward each group member; (*c*) factors related to social class and the values of the delinquent group.

3. *Relation of Sociempathic Ability and Selected Variables*

Correlation coefficients were computed for self and other discrepancies and: intelligence of the boy, age of the boy to the nearest month, the boys' sociometric status, and the length of the boys' stay, in weeks, in the cottage. Sociometric status scores were computed by multiplying first choices by 3, second choices by 2, last choices by 1 and summing the product for each individual. This scoring system was based on the assumption that first, second, and third choices represented varying degrees of preference.

a. Sociempathic ability (*self*). The correlations denoted above are depicted in Table 2. Two of these relationships, the ability to perceive own status and sociometric status scores and the ability to perceive own status and length of stay in the cottage, were significantly ($p. < .05$) related. The relationships between ability to perceive own status and intelligence, age, or the ability to predict the status of others were not significantly related.

TABLE 2
A MATRIX OF CORRELATIONS BETWEEN SELF AND OTHER SOCIEMPATHIC ABILITY AND FOUR SELECTED VARIABLES

Variable	No.	Correlations					
		A	B	C	D	E	F
Self-discrepancy	A	—	—.099	—.434*	—.251	.208	—.401*
Other-discrepancy	B		—	.003	.317	—.204	—.526*
Sociometric status	C			—	.239	—.182	.165
Age	D				—	.233	.099
Intelligence	E					—	.206
Length of stay in cottage	F						—

*A correlation of .361 was significant at the .05 level of probability.

The significant relationship between sociometric status and the ability to perceive own status support the findings of Perry (15) and Trent (19) who reported that persons who are rated high in a given trait tend to be more accurate in rating themselves on that trait. That ability to predict self-status is positively related to length of time in the group indicates that an individual has an opportunity to know his associates before he is able to successfully predict their perceptions of him. Presumably, the longer one knows the associates, all things being equal, the more accurate is his predictions of his own status.

b. Sociempathic ability (*others*). Correlations between the ability to predict the status of others and five variables is shown in Table 2. There was a significant ($p. < .05$) relationship between the ability to perceive the status of others and the length of stay in the cottage unit. Presumably, the longer one knows his associates, the better able one is to accurately predict their status.

There were no significant relationships between ability to perceive the status of others and sociometric status, age, or intelligence. Apparently, these variables were independent of this ability.

c. Length of stay. It should be noticed that the relationship between ability to perceive own status and ability to perceive the status of others was —.099. Ausubel and his colleagues reported the same findings among their high school groups (2, 3). However, it should be observed (Table 2) that length of stay in the cottage was significantly related to both ability to perceive own and others' status. Apparently, the relationship between these two abilities is influenced by the variable length of stay.

What was the real relationship between these abilities? To answer that question, the influence of length of stay upon this relationship was "taken out" by partial correlation, where:

$$r_{AB.F} = \frac{r_{AB} - r_{AF}\ r_{BF}}{\sqrt{(1\text{-}r^2_{AF})\ (1\text{-}r^2_{BF})}} \qquad \text{and,}$$

$r_{AB.F}$ = the correlation between ability to perceive self-status and ability to perceive the status of others with the influence of length of stay removed.

r_{AB} = the correlation between ability to perceive self-status and ability to perceive the status of others.

r_{AF} = the correlation between ability to perceive self-status and length of stay in the cottage.

r_{BF} = the correlation between ability to perceive the status of others and length of stay in the cottage.

The correlation between ability to perceive self-status and ability to perceive the status of others, with the influence of length of stay removed, was raised from —.009 to —.398 which indicated that these abilities were significantly ($p. < .05$) negatively related. Within this delinquent sample therefore, the more accurate a boy's predictions of his own status, the less accurate were his predictions of the status of others. Several reasons could be given which might account for this finding: (*a*) the influence of "projection" among delinquents, i.e., the tendency of a boy to predict that others will rate him sociometrically in the same way that he rated others, (*b*) the desire of the delinquent to perceive his environment in terms of his own needs, and (*c*) more knowledge on the part of the delinquent about the status of others (peck order) in his group but distortion of his perception of his own status.

D. Discussion

The findings of this inquiry should be regarded as tentative due to both the limited sample size employed and due to the unique characteristics of the sample. Whether or not the obtained results can be generalized to similar or dissimilar populations is a matter for future research. However, the results of this study have several implications.

The results of this inquiry supported the hypothesis that delinquent youngster's ability to perceive his own sociometric status in a group tends to be distorted. It was suggested that these distortions may be related to the greater need among the maladjusted to perceive his interpersonal relationships in terms of his need for affection and attention.

The hypothesis, that the delinquent's ability to perceive the sociometric status of others was inferior to the high school group, was not supported by the findings of this study. The delinquent sample was significantly superior in this ability. This finding was related to the delinquent's greater sensitivity and perhaps experience in gang activities. Apparently, the gangs from which some of the delinquents came were well organized in terms of status relationships or "peck order."

The findings above suggest the implication that an individual's perception of his own sociometric status may not affect the accuracy with which he perceives the status of others. There appears to be no relationship between these two perceptions.

Several questions, not answered by this inquiry, might prove fertile ground for further research: (*a*) If socio-economic status implies distinct differences in ways of behaving among individuals of different socio-economic classes, are there differences between individuals of different classes in perceiving own and others' status? (*b*) What is the real influence of the degree of divergence between an individual's concept of his real self and his concept of his ideal self on sociempathic ability? (*c*) What is the real influence of the length of time individuals have been members of the same group?

E. Summary

The ability of a cottage group of 30 delinquent boys at a residential state training school to: (*a*) predict the sociometric ratings given them by their cottage mates, and (*b*) to predict the sociometric status of others in the group was studied. Ability to perceive sociometric status of self and others was measured by discrepancy scores which represented the sum of the deviations of how others would rate the individual on a five-point acceptance-rejection scale as compared to the individual's actual rating; and, how the individual rated the sociometric status of others, on a five-point scale, as compared to the other individual's actual rating, respectively.

Two types of results were studied: (*a*) a comparison of self and other sociempathic ability between the delinquent and non-delinquent high school sample of 44 boys and girls (3); (*b*) an analysis of the relationship, within the delinquent sample, between sociempathic ability and age, intelligence, sociometric status and length of stay in the cottage.

The major findings of this investigation may be summarized as follows:

1. *Delinquent vs. High School Group*

a. There were significant differences between groups in ratings for others and predicted ratings for self. The delinquent group's ratings were skewed in the positive direction, whereas the high school group ratings were normally distributed. The delinquents tended to overestimate their own status.

b. There were no significant group differences for predicting ratings of others.

c. The high school group was significantly superior in the ability to predict their own sociometric status.

d. The high school group was significantly superior in the ability to predict how others in the group rated them.

e. The delinquent group was significantly superior in the ability to perceive the sociometric status of others.

2. *Within the Delinquent Group*

a. The greater the length of cottage stay the more accurate the ability to perceive the sociometric status of self and the sociometric status of others.

b. There was a zero-order correlation between the ability to predict own status and the ability to predict the status of others due to the influence of length of stay. When the influence of length of stay was partialed out, ability to predict own status was *inversely* related to ability to predict the sociometric status of others.

c. Ability to perceive self sociometric status was positively related to sociometric status. Ability to perceive the status of others was unrelated to sociometric status.

d. There were no significant relationships between sociempathic ability and age or intelligence.

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VIGILANCE AS A FACTOR IN REINFORCEMENT*

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A. PROBLEM

In experiments on conditioning involving noxious stimulation as reinforcement, the non-avoidance procedure is sometimes more efficient for the acquisition of *CR* than the avoidance procedure. Such superiority of the non-avoidance technique, however, is found only when the noxious stimulus consistently evokes the same response, and, consequently, does not lead to counter-conditioning, such as that described by Sheffield (4).

In terms of reinforcement theory this higher efficiency is attributed to the greater frequency with which the response is followed by reduction in pain drive. This reduction occurs in close temporal proximity with cessation of acquired fear drive, and the two summate to contribute a greater positive increment to the probability of *CR* evocation, than that which would result from fear termination only.

From this interpretation one would expect that if an animal trained with non-avoidance technique were occasionally permitted to avoid the noxious stimulus, the only effect of such avoidance trial would be to retard somewhat the rate of acquisition. There would still, however, be a small increment to the probability of *CR* evocation; this is contributed by fear reduction which is contingent on termination of the *CS*.

This prediction, however, does not stand up under empirical scrutiny. In experiments with goats at the Cornell Behavior Farm it was found that occasional omissions of the noxious stimulus, instead of adding a minimal increment to the probability of *CR* evocation, have a pronounced adverse effect on the animal's tendency to respond to the signal.

B. PROCEDURE

The procedure used at Cornell is a modified form of avoidance conditioning: a *CS* is presented for a specified duration, at the end of which a brief electric shock is delivered to the animal's right foreleg. The shock can be avoided only if the leg is flexed at its onset; any other flexions during the signal do not prevent it. Since early *CR*'s invariably occur well in

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advance of the shock, the procedure, in its initial stage, is indistinguishable from non-avoidance training.

Six animals served as subjects. For two, the *CS* was reduced illumination of 10 seconds' duration. For two others, the *CS* was a buzzer, also lasting 10 seconds. For the remaining two animals the *CS* was a buzzer of duration randomly varied from two to 10 seconds. The shock serving as the unconditioned stimulus was of 6 to 8 volts, lasting for one-half second. Details of the program for individual animals are shown in Table 1.

TABLE 1
EXPERIMENTAL DESIGN FOR INDIVIDUAL SUBJECTS

Goat	CS	Duration of *CS* in seconds	Inter-trial duration in seconds	No. of trials per session
G27	Dimming of light	10	60	50
G29	Dimming of light	10	60	50
T	Buzzer	10	60	25
F	Buzzer	10	60	20
K	Buzzer	2-10	29-109	25
L	Buzzer	2-10	29-109	20

After a series of *CR*'s followed by shock the animal's response takes the form of a rapid sequence of flexions, described in an earlier paper (1). One of these coincides, eventually, with the onset of the shock, and the latter is avoided.

To gauge the effect of avoidance the probability of *CR* evocation can be roughly estimated from the animal's prior performance. With probability value greater than chance ($p > .5$) one may expect the animal to yield a *CR* on the trial following the omission of shock. With values less than chance ($p < .5$) one would not be surprised at the animal's failure to respond to the signal on the subsequent trial. With this approach, the effect of omission of shock shows up in reversals from prediction, provided such reversals occur consistently in the same direction.

C. RESULTS

As an index of prior performance I have taken arbitrarily the 10 consecutive trials preceding the one on which shock was omitted, and counted on how many of these the animal gave *CR*'s. The frequencies shown in Table 2 are those preceding the first six avoidances for each animal. The table also contains the record of the animal's performance on the first trial after omission of shock: Plus signs indicate that the animal gave a *CR* on that trial; minus signs indicate a failure to respond.

The frequencies of Table 2, divided by 10, give maximum likelihood estimates of the probability of *CR* evocation. It is apparent that these estimates are far too optimistic: The table shows 16 reversals, only one of which is in the direction of improved performance. By contrast, there are 15 values of $p > .5$ followed by failures of *CR*.

TABLE 2

Numbers of *CR*'s Given by Each Animal During 10 Trials Preceding an Avoidance Trial: Plus and Minus Signs Indicate Respectively the Occurrence and Non-Occurrence of *CR* on Trial Subsequent to the Omission of Shock

	Ordinal number of omission of shock					
Goat	1	2	3	4	5	6
G29	2—	7—	8+	8—	6+	6—
G27	7—	7+	9+	8—	7—	6+
T	9+	9—	9—	7+	7+	7+
F	5—	7—	7+	7—	10—	9—
K	2—	2—	1—	1+	2—	5+
L	1—	9—	9—	9+	9—	7+

Another way to analyze the data is to pool the performance of the six animals, following each omission of shock. By totaling the number of plus signs in each column of Table 2 we obtain the frequency of *CR*'s following each omission. These totals appear rather small when contrasted to the relatively stable performance of most animals prior to the omission. Therefore, it is pertinent to ask: What is the probability that the frequencies, if chance alone were operating, would be as small or smaller?

TABLE 3

Cumulative Probabilities That *CR* Frequencies Should Be No Greater Than Those Obtained from the Six Animals After Each Omission of Shock

No. of omission	1	2	3	4	5	6
No. of *CR*'s (f_o)	1	1	3	3	2	4
$P \{ f \leqslant f_o \}$	.12	.01	.16	.28	.05	.66

The question is answered in Table 3, where the cumulative probabilities of obtained frequencies were calculated from the maximum likelihood estimates of Table 2. For the first five omissions the frequencies of *CR*'s are consistently below chance expectancy; and this observation makes it hard to escape the conclusion that omissions of shock in the early stages of conditioning have an adverse effect on the already established tendency to respond to the signal.

D. DISCUSSION

The phenomenon, though at variance with inferences made from drive reduction theory, is compatible with the vigilance theory of conditioning (2). The two postulates of this theory are:

1. In a given situation a supraliminal sensory stimulus evokes in an organism one of a bounded set of *N* discrete and mutually exclusive specific vigilance reactions.

2. Sensory stimulation immediately consequent upon the performance of each specific vigilance reaction becomes a conditioned stimulus for any response with which it is contiguous.

For purposes of operational analysis, specific vigilance reactions are defined as stochastic variables. They are, however, assumed to correspond to certain neurophysiological events contingent on exposure to stimulation. Any such event includes the phasic movement of orientation to stimulus, as well as the tonic innervation contributing to the maintenance of posture. Unfortunately, the latter component has been pretty much neglected in studies of behavior, despite the fact that its importance has been emphasized by Sherrington (5) and by Henry Head (3). The more pertinent description is that of Head, who relates the concept of vigilance directly to the heightened extensor-postural tone.

Such tone is clearly evident in goats and sheep when the signal is presented. After the phasic movement of orientation, the body assumes a stance maximally adaptive for flexion: The head shifts to the left, away from the limb to be shocked; the left foreleg and the right hindleg are obviously rigid; at times there is also partial flexion of the right foreleg as well as the left hindleg. The entire picture strongly resembles one of Sherrington's reflex figures.

The only event which effectively terminates this state is the unconditioned stimulus. The effect of the shock is two-fold: It physically throws the animal off its precarious balance, and it serves as a cue for any diversionary activity in which the animal may engage between trials. In the absence of shock the preparatory state is maintained for some time beyond termination of the signal, eventually giving way to a great deal of agitation accompanied by struggling and spontaneous flexions. Such agitation persists until the subsequent trial and interferes with the animal's ability to respond to the signal with one of the previously conditioned specific vigilance reactions. Since these are postulated as essential mediating variables, the failure of *CR* follows logically from the original assumptions.

In the mathematical formulation of the vigilance theory, omission of shock enlarges the parameter N, defined as the repertory of the animal's specific vigilance reactions. With continued training, these newly introduced reactions become conditioned to flexion, and the omission of shock loses its adverse effect.

It should be noted that the results of this experiment are also compatible with White's concept of "completion hypothesis" (6). In describing this concept White defines reinforcement in terms of completion of anticipatory reactions. Despite his expressed doubt that shock reinforcement should be included within the limits of his definition, the results of this experiment suggest that White's conceptual scheme may be more generally applicable than he had anticipated.

E. Summary

Observation of goats during early stages of avoidance conditioning indicates that omission of shock decreases the probability of *CR*'s on ensuing trials. The findings are interpreted in terms of interference between postural innervation which has not been terminated and subsequent vigilance reaction to *CS*, postulated as essential for *CR*.

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THE RORSCHACH RECORDS OF A SUPERIOR CHILD*

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A. THE SUBJECT

The literature is replete with Rorschach protocols of children at various levels of intelligence (4, 5). However, no paper reporting a longitudinal series of such protocols for a single accelerated child has come to the author's attention. The subject of this longitudinal study is the author's daughter, Ruth, born July 26, 1950. She has been Rorschached every three months since she was 2 years, 6 months of age. In addition, the Revised Binet (7), the Leiter International Performance Scale (6), and the *WISC* (8) have been administered at intervals.

B. THE DATA

At 3 years, 3 months of age Ruth earned a mental age score of 4 years, 3 months and an *IQ* rating of 131 on the Revised Binet. The concurrent Rorschach protocol was:

I. Looks like (*11*) a lamb with two faces.
II. *11* two elephants with some red and fighting.
III. *11* a monkey with more red and 'splosion. These two animals,
    the monkey, they want to fight, so they do. These are two
    good men monkeys.
IV. *11* a bad ghost with a butterfly on its head.
V. *11* a big bug, a butterfly with long tails.
VI. *11* a big bug with long lines.
VII. A round, just a plain round.
VIII. A pretty butterfly.
IX. The colors make a pretty butterfly.
X. A gathering around.

This protocol discloses a significant change in responsivity over her previous ones. The concepts, at this age, are much more elaborate both in expression and in content, with acceptable integration of form, color, and movement. The whole responses are relevant, in the main, to the inkblots. The presence of FM— and m—determined percepts are not unusual but potential M in the response to Plate III is notable. These movement-determined con-

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cepts reveal the tolerance for change and a respectable proportion of imaginative creativity within this youngster.

One and one-half years later, at 4 years, 6 months of age, Ruth took the Leiter International Performance Scale. The mental age and *IQ* ratings are 5 years, 9 months and 130 respectively. The test spread is from the basal age of IV to the terminal age of X. The concomitant Rorschach productivity is:

I. I see a butterfly. W F+ A P
II. Two elephants with blood on them. W F+, C A, Bl
III. Two men that are dead. D F+ H P
A ribbon. D FC+ Clo P
IV. A monster without a head. W F+ (Hd)
V. A butterfly that's longer than the other butterfly. W F+ A P
VI. A dead bug. W F A
VII. *11* a house. D FC'+ Arch
11 animals. D F+ A
VIII. *11* a butterfly, not dead. D F+ A
Little animals. D FM+ A P
IX. Two elephants. D F— A
Two clowns, dead. D F+ H P
Two babies. D F+ H P
X. Two spiders. D F+ A P
Two snakes. D F+ A
Billy goat. D F+ A
A dead butterfly. D F A

The productivity is surprisingly out of keeping with the assessed intellectual achievement. She has suppressed almost all manifestation of drive and imagination and she is not relating well with her social milieu despite the fact that behavioral observation discloses a markedly extroverted personality structure. She is well tied to reality, too much so. Nothing in this protocol reflects the functioning of a child who is accelerated by one year and three months. The language of the responses is closer to her mental age than her chronological age, but the contents are inconsistent with the former.

This occurred at the time that Ruth had been introduced into a preprimary school situation. Evidently she was going through some trying moments in her adjustment to a different set of interpersonal relationships and a wider variety of rôles. The other youngsters were not as permissive and as tolerant of her ideas and actions as were her parents. This was a new experience which caused her to "pull in" a bit and to reevaluate her previous behavior in light of the new circumstances. This resulted in cautious, highly objective ("stick to the facts") responsiveness.[1]

When Ruth was 5 years, 6 months of age she achieved an *IQ* of 133 on the *WISC* (Verbal *IQ*, 143; Performance *IQ*, 117) with an estimated mental age of 7 years, 6 months (9, p. 383). The inkblot responses were:

I. A butterfly; *11* a butterfly to me. W F+ A P
II. Two elephants with blood on their feet. They're crashing their trunks together and blood is coming up here. W FM+, CF A, Bl P
III. I see two broken men with a bow and blood. They're making something, they put a bow in the air and they're trying to catch it—both of them. WS M+, CF H, Bl P
IV. A monster without a head. W M+ (H)
V. Another butterfly. W FM+ A P
VI. A cockroach. W FM+ A
VII. This *11* two baby elephants. W FM+ A
Rock here. D F N
VIII. *11* two animals, like bears. D FM+ A P
A stick of candy. D F Ad
IX. Two clowns. D M+ H P
Two babies. D M+ H P
A stick. D F Obj.
X. *11* a spider. D F+ A P
A butterfly, no head, it's dead. D F Ad
Bow. D F+ Clo
Rabbit. D F+ A P
Feet. D F Ad
Cloud. D CF Cl

The richness of imaginative ideation is immediately obvious in this record. The over-all approach to problems is satisfactory yet Ruth can deal with parts of situations adequately. The total impression gained from this protocol indicates an appropriate use of the intellectual acceleration manifested in the test of intelligence.

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[1] This interesting development illustrates the extreme caution that Rorschachers must exercise in the interpretation of single protocols (3). For the sake of completion, the Rorschach record obtained three months later is much different. It is more in accord with Ruth's intellectual ability, emotional motility, and tolerance for adjusting to new situations. For example, the Sum C increased from 0 to 5.5 in the later record. This is certainly more characteristic of her mode of relating to the objects, events, and persons in her life space.

C. SUMMARY

This paper presented a brief segment of a longitudinal developmental study as reflected in a series of Rorschach inkblot protocols and intelligence tests. This subject was administered three intelligence tests and the Rorschach inkblots at regular intervals. The paired intelligence and Rorschach test records were discussed.

In sum, two of the three Rorschach records reflected the superior intellectual attainment of the child. One Rorschach protocol, however, disclosed a wide discrepancy with the data of the intelligence test. An effort was made to explain this variance. The major inference, evidenced early in this longitudinal study (1, 2, 3), is that extreme caution must be used in the interpretation of a single Rorschach record as representative of the individual's personality structure and dynamics.

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RELATIONSHIPS BETWEEN SOME BACKGROUND FACTORS AND CHILDREN'S INTERPERSONAL ATTITUDE*

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A. THE PROBLEM

Psychologists generally agree that unfavorable attitudes and behavior on part of the parents will make good social adjustment difficult for the child. The study presented here was designed to investigate the relationships between some specific parental attitudes and characteristics, on the one hand, and children's attitude toward others and their perception of others and themselves, on the other. The present paper is concerned with three aspects of parental personality and attitude which seem to be particularly disturbing for the development of a young child's interpersonal relationships. These are: (*a*) an unstable mother, (*b*) parental rejection, and (*c*) the effect of prolonged or sudden separation or emotional withdrawal by the parents.

These three background variables were defined as follows: (*a*) An unstable mother is one who is known to possess one or more of these characteristics: immature and dependent, depressed, moody, neurotic, compulsive, psychotic, excessively rigid, suicidal attempts, promiscuous, prostitution, irresponsibility toward family and running around, temper outbursts. (*b*) A rejecting parent is one who states explicitly his dislike or disapproval of child, who shows longstanding indifference or neglect of child, who is excessively punitive and abusive, who adheres rigidly to standards which are unobtainable for the child, who shows marked favoritism to a sibling of the subject child. (*c*) A prolonged or sudden separation or withdrawal by parent is considered a separation that lasts at least six months and occurs during the first six years of the child's life (age 1 to 6 years) due to: parent's death, desertion, divorce, institutionalization, neglect to visit child living away from home, displacement of child by a younger sibling after the child had been the favorite or the youngest in the family for five years or more.

B. HYPOTHESES

The hypotheses for this study were derived from Harry S. Sullivan's Theory of Interpersonal Relationships. It seems reasonable to believe, as

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[1] The writer wishes to express her indebtedness to Prof. Paul Mussen, under whose direction this research was conducted, for his continued guidance, assistance, and encouragement.

Sullivan suggests, that children derive their self-evaluation from the "reflected appraisals of significant other ones." That is, children tend to see themselves the way they perceive that others see them. If a child has learned to accept himself as worthy of love and consideration because others treat him with affection and respect, then he will also feel friendly and loving toward others. If, however, he has come to think of himself as inferior or unlovable because his parents have treated him with rejection and punishment, then he will tend to feel hostile toward others and will consider them just as unworthy of love as he considers himself.

The relationship with the mother or "mothering one" is the first significant relationship in a child's life and forms the basis for his interpersonal attitudes. Thus this mother-child relationship influences the subsequent social relationships. Sullivan points out that if the mother is unstable or unduly tense she will transmit to the child feelings of anxiety. The *First Hypothesis* of the present study deals with this concept, it states: Compared with children of stable mothers more children of unstable mothers will be anxious.

A child who experiences warmth and affection will have a sense of well being and security, he will experience a minimum of anxiety. The relationships with his parents will be rewarding for him. A neglected and unwanted child, however, will find little comfort in the company of his elders. In families where the parents have little love for their children, the siblings too will reveal little affection for each other. More likely they will compete with each other for whatever attention they can get from the parents.

The *Second Hypothesis* deals with two different types of parental rejection: general rejection by both parents, and marked favoritism by one or both parents for a sibling of the subject child. Specifically it states: More children of rejecting parents than of non-rejecting parents will develop feelings of inadequacy and a lack of affection toward others. Furthermore, compared with children who are not discriminated against at home more children whose parents show favoritism toward a sibling will develop feelings of inadequacy. They will also tend to be hostile toward their parents and especially toward their sibling.

In early childhood the youngster needs a stable environment where he can try out new kinds of behavior and can explore new kinds of relationships without being threatened by unexpected and inconsistent behavior of the significant adults. It appears that a sudden separation from the parents or a change in the parents' attitude toward a child, e.g., withdrawal of affection, are very traumatic for a young child. There are three aspects to the *Third*

Hypothesis of the present study: (*a*) Compared with children who have never been separated from their mother more of those who were separated from her in early life will feel unloved and will tend to feel ambivalent toward her. (*b*) Compared with children who have never been separated from their father more of those who were separated from him in early life will feel inadequate and will tend to be hostile toward him. (*c*) Compared with children who have never held and lost preferential status at home more of those who had preferred status in the home and later lost it to a younger sibling will feel unloved. They will also tend to be hostile toward the sibling and will tend to withdraw emotionally from the parents.

C. SUBJECTS

Seventy-five delinquent boys from the Juvenile Diagnostic Center in Columbus, Ohio, were the subjects of the present study. All boys were between 8 years and 7 months and 14 years and 11 months old. The mean age was 12 years. None of these boys were mentally deficient, that is, their Intelligence Quotients, as measured on the Wechsler Intelligence Scale for Children, were above 70. The mean Intelligence Quotient was 95. Children suffering from severe emotional disturbance or serious organic involvement were not included in this study.

D. METHODOLOGY

The data for this study were derived from case records from the files of the Juvenile Diagnostic Center and from test protocols. Only those case records were included which contained detailed information about the child's parents and family history. These case histories were collected by professional social workers who had personal interviews with the parents and had additional data from other social agencies and the schools. Even so it should be recognized that these records were not always as complete as might be desired and that some bias may well be present.

The information obtained from the case records on each subject was scored and categorized into the following Background Variables:

Unstable Mother.
Rejecting Parent.
Favored Sibling.
Separation from Mother During the First Six Years of Life.
Separation from Father During the First Six Years of Life.
Displacement of Child By Younger Sibling.

The investigator administered three tests to each subject in one individual session. These three tests were: The Rogers Test of Personality Adjustment, a set of 10 Incomplete Stories designed by the investigator, and five *TAT* cards (1, 3, 6BM, 7BM, 13B). The Rogers Test of Personality Adjustment was scored according to the system suggested by Rogers with some minor variations. The Incomplete Stories and the *TAT* stories were scored for manifest content only, that is, the number of specifically stated themes was counted, no interpetations were made. To test the reliability and communicability of the scoring system the investigator and another psychologist[1] each scored independently of each other 10 protocols selected at random from both the delinquents group and from a group of well adjusted school children. A total of 150 stories was checked. Of the 302 scores made by the examiner 244 were found to be in total agreement with those of the other psychologist, i.e., there was an agreement of 81 per cent on the scorings made.

The themes counted in the stories and the responses on the Rogers Test were combined for each subject into a total score. These scores were grouped into the following operationally defined 13 Interpersonal Attitude Variables:

- Self-evaluation:
  - Feeling Anxious.
  - Feeling Inadequate.
  - Feeling Unloved.
- Parent Relationship:
  - Affection toward Parent.
  - Affection from Parent.
  - Aggression toward Parent.
  - Aggression from Parent.
- Sibling Relationship:
  - Affection toward Sibling.
  - Aggression toward Sibling.
- Peer Relationship:
  - Affection toward Peer.
  - Affection from Peer.
  - Aggression toward Peer.
  - Aggression from Peer.

The hypotheses were then translated into these Variables, that is, the hypotheses were expressed in terms of the relevant Background Variable involved and the relationships suggested in the hypotheses were stated in terms of Interpersonal Attitude Variables. The scores on all these Variables could then be handled as statistical data. To test each hypothesis the subjects were divided into two groups: one in which the relevant Background Variable was present in the subject's record, and one in which it was absent. Each subject was called "high" or "low," that is, above or below the mean score for all subjects, on each of the Interpersonal Attitude Variables. Chi-square tests were applied to determine whether the presence or absence of a Background Variable was significantly related to a "high" or "low" score on the Interpersonal Attitude Variable being considered. Thus, the hypothesized relationships were tested for significance. Only those subjects were included in the test of a particular hypothesis whose case records furnished explicit information on the Background Variable involved in the specific hypothesis.

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[1] The writer wishes to thank Werner J. Koppitz for his assistance in testing the reliability of the scoring system used in the present study.

E. RESULTS

A total of 78 chi-squares were computed, that is, the relationship between each of the Background Variables and each of the Interpersonal Attitude Variables was tested. Of these 22 relationships were included in the hypotheses and had been predicted to be significant. The results show that 11 chi-square values were found to be significant at the 5 per cent level or better. Ten additional chi-squares were found to be significant between the 5 and 10 per cent level. The total number of significant chi-square values found by far exceeds what could be expected on the basis of chance alone.

Table 1 gives a summary of each relevant Background Variable and the significant relationships between the presence and absence of the Variable and Interpersonal Attitude Variables.

1. *Hypothesis 1*

As was hypothesized more children of unstable mothers than of stable mothers tended to show high Feelings of Anxiousness. They also revealed high Affection toward Parent and high Aggression from Peers.

2. *Hypothesis 2*

More children of rejecting than of non-rejecting parents showed high Feelings of Inadequacy. They also revealed much less affection for their families, i.e., significantly more of these children tended to show low Affection toward Parent and low Affection toward Sibling.

It was found that compared with children who were not discriminated against at home more of those whose parents showed favoritism toward a sibling scored high on Feelings of Inadequacy and low on Affection toward

Sibling. Strong trends were indicated showing more of these children feel high Aggression toward Parent and high Aggression toward Sibling.

TABLE 1
PREDICTED AND EMPIRICALLY FOUND SIGNIFICANT RELATIONSHIPS BETWEEN BACKGROUND VARIABLES AND INTERPERSONAL ATTITUDE VARIABLES

Hypotheses	Background variable	Interpersonal attitude variable	Chi-square value	*P* value
1	Unstable mother *N* 50-14	High feeling anxious*	2.8	<.10
		High affection to parent	2.9	<.10
		High aggression from peer	4.3	<.05
2	Rejecting parents *N* 43-28	High feeling inadequate*	5.2	<.05
		Low affection to parent*	7.9	<.01
		Low affection to sibling*	7.4	<.01
	Favored sibling *N* 20-40	High feeling inadequate*	4.1	<.05
		High aggression to parent*	2.7	<.10
		Low affection to sibling*	8.5	<.01
		High aggression to sibling	3.1	<.10
3 1)	Separation from mother *N* 27-48	High feeling unloved*	3.5	<.10
		Low affection to parent*	8.5	<.01
		High affection from parent*	2.9	<.10
		Low affection to sibling	3.0	<.10
2)	Separation from father *N* 47-26	High feeling inadequate*	3.4	<.10
		Low affection to parent*	4.7	<.05
		High aggression to parent*	4.3	<.05
		High affection to peer	4.9	<.05
3)	Displaced child *N* 21-54	High feeling unloved*	12.3	<.001
		High aggression to sibling	3.2	<.10
		Low affection from parent	3.5	<.10

*Relationship was predicted from hypothesis.

3. *Hypothesis 3*

1. Compared with children who had never experienced separation from the mother children who had been separated from her before the age of six showed significantly more often low Affection toward Parent and low Affection toward Sibling. They tended to reveal their ambivalence by indicating high Feeling Unloved and high Affection from Parent.

2. Compared with children who had never been separated from their father significantly more of those who had experienced separation from him before the age of six showed hostility toward the father, i.e., they had a considerably higher incidence of low Affection toward Parent and high Aggression toward Parent. More of these children tended to reveal high Feelings of Inadequacy and high Affection toward Peers.

3. Compared with children who had never held and lost a preferred status at home significantly more children who had been displaced from a

favored position at home by a younger sibling showed high Feelings of being Unloved. They also tended to show high Aggression toward Sibling and low Affection from Parent.

4. *Relationship between Background Variables*

It may be expected that the hypotheses presented here are not really independent of each other. It would appear for instance, that some of the relevant Background Variables are closely related to each other and will tend to be associated with the same family situation.

The interrelationship between Background Variables was tested by means of chi-square tests, i.e., we determined whether the presence of one Background Variable was associated with the presence of another Variable or whether the presence of one Background Variable had nothing to do with the presence of another one. A total of 15 chi-squares were computed. Of these three were found to be significant at the 5 per cent level or better and one at the 10 per cent level. The number of significant chi-squares found exceeds what could be expected by chance alone. Table 2 lists the significant relationships between Background Variables together with the chi-square values obtained and the level of significance.

TABLE 2
INTERRELATONSHIP BETWEEN BACKGROUND VARIABLES

Background variables compared	χ^2 value	P value
Unstable mother and favored sibling*	3.4*	.10
Rejecting parent and favored sibling	4.9	.05
Separation from mother and separation from father	6.4	.02
Separation from mother and displaced child	4.3	.05

*Presence of one variable is related to the absence of the other variable.

Table 2 shows that each Background Variable seems to be related to at least one other Background Variable. Thus it was found that mothers who consistently show favoritism to one child do not tend to be unstable. On the other hand, parents apparently can be generally rejecting and can still favor one specific child over another one, that is, one of the parents may be somewhat less rejecting to one of the children even though he is rejecting to all of them to a certain extent. It seems that children who were separated from the mother were also frequently separated from the father in early life. This is not unexpected in a population where many children spent long periods of time in foster homes or institutions. Separation from the mother was also found to be associated with displacement in the mother's affection by a younger sibling, e.g., the mother who leaves her family to remarry may have another child from this new union to whom she gives much love and affection.

The interrelationship between Background Variables on the one hand, and the differences found in the relationships between Interpersonal Attitude Variables and Background Variables on the other hand (see Table 1), seem to add to the validity of the specific hypotheses.

F. Discussion

In the present study three hypotheses, developed from Harry S. Sullivan's system, were tested. All of these hypotheses deal with family background factors and their relationships to children's interpersonal attitudes and self-evaluation.

As Sullivan suggested, it was found that more children of unstable mothers tend to be anxious than children of stable mothers. However, it appears that an unstable mother need not necessarily be also hostile and rejecting but is characteristically vacillating in her behavior. Since the mother satisfies the child's needs and is often quite affectionate the child will tend to feel friendly toward her. Our data suggest that children of unstable mothers tend to be affectionate toward their mothers. Since they receive their basic satisfactions from her they find it difficult to become overtly aggressive toward her when she is at times disapproving or punishing. Rather these children tend to internalize their aggression and will thus feel guilty. Anxiety, according to Sullivan, may be felt as guilt or as the anticipated disapproval of significant other-ones (Hypothesis 1).

Anxiety is acquired during infancy but its effect is so powerful and enduring that it was still manifest in our preadolescent subjects who had unstable mothers in early childhood. During preadolescence the peers get to be highly significant for the child. It seems of interest, therefore, that our data show that the preadolescent boys with unstable mothers tend to perceive their peers as disapproving. It was stated earlier that anxiety may be experienced as the anticipated disapproval of the significant persons in a child's life at the stage of development he happens to be at, in this case it is preadolescence.

Neglected and unwanted children were found to feel quite inadequate. They find little comfort in the company of their parents. Social relationships are not rewarding for the rejected child and he will tend to avoid them in order to escape the anxiety that usually accompanies such interactions. These children will perceive themselves as unworthy of love since they were not loved at home. When they are old enough to compare themselves with other children who are accepted by their parents the rejected children will tend to feel inferior (Hypothesis 2).

Children with rejecting parents were found to show a lack of tenderness though not necessarily overt hostility toward their siblings. If a little affection is forthcoming from the parents then the siblings tend to compete for whatever attention they can get. But if the parents actually favor one child and reject another one, then the rejected child will become quite aggressive and hostile toward the favored sibling as the cause for his rejection or he may displace his hostility toward the parents onto the sibling.

Separation from parents is usually considered a most traumatic event for a young child. Our findings suggest that separation from the mother affects the child somewhat differently than does separation from the father. Separation from the mother during the first six years of life is very threatening to the child and shatters the basic relationship he has come to depend on. The pre-adolescent subjects in our study who had been separated from their mother in early childhood tended to feel rejected and unloved. They showed ambivalence toward their mother who had satisfied their needs in infancy, but left them later on. The delinquent boys revealed this ambivalence by showing simultaneously a longing for the mother's affection and a lack of affection toward her (Hypothesis 3,1).

Almost as threatening as actual physical separation from the mother is the sudden withdrawal of her love and affection. This is particularly the case if the child was the youngest or favored child for a number of years. The unexpected loss of the mother's attention is difficult for a child to comprehend and tends to make him feel unwanted and unloved. Our data suggest that if a child is displaced in his mother's affection by a younger sibling, he will direct his hostility toward the sibling rather than toward the mother since this is less threatening for the child (Hypothesis 3,3).

In the normal course of events the young boy will look to his father as a model after whom to pattern his behavior. But if he was separated from his father in early life he will tend to select peers or older boys as models for his behavior. In such cases the child will feel quite hostile toward the father for leaving him. He will also tend to feel inferior and inadequate compared to other boys who have fathers who engage in activities with them and who show concern for them. The inadequacy feelings may be in part due to jealousy of the other boys, or a boy may feel inadequate because he has no father to model his behavior after and may feel that he lacks masculine identification (Hypothesis 3,2).

G. SUMMARY

The investigation presented here tested three hypotheses, developed from H. S. Sullivan's Theory of Interpersonal Relationships, dealing with family background factors and their relationship to children's attitudes toward others and themselves. Seventy-five institutionalized delinquent boys served as subjects for this study. All were pre-adolescents and were not mentally deficient.

The findings suggest that parental personalities and attitudes have significant effects on children's self-evaluation and on their interpersonal attitudes. These attitudes, though formed in early childhood, appear to be relatively enduring and can be evidenced in pre-adolescent boys. However, a modification of these attitudes and relationships can occur through later experiences. Attitudes held toward significant adults in early childhood may be later transferred to peers.

The present study shows that a child will feel anxious and will consider himself bad and guilty if his mother was unstable during his early years. He will feel inadequate and inferior in comparison with other children if his parents were rejecting. And finally, a child will tend to feel unwanted and unloved if he is suddenly deprived of his mother's love and affection after he had experienced a period of relative security and well being in her tender care. A child may encounter any one or more of these situations at one time since they are not mutually exclusive. Thus a child may feel anxious, inadequate, and unloved all at the same time.

Children are apt to feel hostile toward parents who reject them or leave them. If the relationship with their parents is poor then they will also tend to have poor relationships with their siblings. There was found to be a tendency for boys who were separated from their fathers in early life to compensate for this loss by establishing close peer relationships.

Most of the relationships presented here are not incompatible with the findings of other studies. Our data seem to offer additional evidence that there are direct and measurable relationships between parental attitudes and actions and children's interpersonal attitudes and self-evaluation.

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THE VALIDITY OF THE GUESS-WHO TECHNIQUE WITH LARGE ADOLESCENT POPULATIONS*

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A. THE PROBLEM

Considerable attention has been given in recent years to the reputation of children, that is, the way children are perceived by their peers. Most methods of obtaining this information, such as ranking, paired comparisons, and the usual rating scale, are practical only with small groups where each person is acquainted with every other member of the group. For the study of large adolescent populations where most of the members are acquainted with only a fraction of the group, the guess-who technique usually has been adopted.

To yield a trait score, the guess-who method in its simplest form involves requesting the members of a group to nominate persons in this group for each of two statements or word pictures, one statement representing behavior which falls on what may be called the positive side of the trait continuum, and the other indicating behavior on the negative side. The usual method of scoring these ratings, originated by the *CEI* (1), is to obtain the algebraic sum of the numbers of positive and negative mentions each person receives. The writer (3) has presented a weighted method of scoring those traits which are not dependent on how well known an individual is by the rating group. This formula involves dividing the algebraic sum of the positive and negative mentions by the total number of times the person is mentioned on a variety of traits with the quotient being multiplied by 100. This scoring method essentially weights each person's score in inverse proportion to what may be taken as a measure of how well known he is by the raters. The assumption underlying this formula is that the farther an individual deviates from the mean of the group on a trait, the more often he will be mentioned for the corresponding positive or negative statements by those who know him.

The purpose of this study was to discover how closely these bipolar guess-who ratings, obtained from a large adolescent population and scored by the weighted method, correspond to ratings made by adults on a five- or

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seven-point scale. For comparison purposes the ratings were also scored by the original *CEI* method. Previous investigations (2, 3, 4, 5) have found considerable agreement between guess-who ratings, scored in various ways, and ratings by adults, but in each instance the coefficients reflect the fact that adult observers and the adolescents may have interpreted the traits somewhat differently. To offer a more accurate validity check of this bipolar technique and the proposed formula, the two traits selected for this study were school grades and coöperation with teachers where the validity criteria were teacher judgments. On these traits there presumably would be a minimum of disagreement between the adult raters and the adolescents, since each student's characteristics on these traits is continually being made clear to the school population by the teachers themselves.

B. The Population and the Guess-Who Ratings

The 443 members of the high tenth grade in a large suburban high school were rated on 24 guess-who statements by 90 per cent of this class yielding scores on 12 bipolar traits. Each rater was asked to nominate members of his or her own sex by recording pre-assigned code numbers on mark-sense cards. Although, to encourage unfavorable ratings raters were requested not to sign their names on the rating materials, by means of a fluorescent ink coding the identity of each rater was discovered and all self-mentions were discarded. The population for this study consisted of 158 boys and 174 girls who were mentioned an average of three times or more per trait for the entire 12 traits, and for whom school records were available.

Ratings for the two traits used in this study were obtained from the following statements where the first of each pair was assigned positive values, the appropriate changes on the girls' form being indicated in parentheses:

> Here is someone who usually gets high marks in his (her) schoolwork.
> Here is someone who usually gets low marks in his (her) schoolwork.
> Here is someone who tries hard to coöperate with his (her) teachers.
> Here is someone who doesn't try very hard to coöperate with his (her) teachers.

The reliability of the ratings for each sex on these two traits, scored by the *CEI* formula, was determined by dividing the raters at random into two groups. The correlations between the two sets of ratings when corrected yielded reliability coefficients ranging from .91 to .96. The correlation between the two traits was .85 for the boys and .82 for the girls. No estimate of the reliability of the weighted scores was obtainable without a re-test. But since the correlation between the two traits for the weighted scores was

.71 for the boys and .75 for the girls, it is probable that the reliabilities for the weighted method were somewhat less than those for the *CEI* method. The distributions for the weighted scores were approximately normal, while the *CEI* scores yielded highly leptokurtic distributions.

C. THE CRITERIA OF TEACHER JUDGMENTS

The grade point average during both semesters in the tenth grade was used as the criterion for grades. On a scale where *A* equals 4 and *F* equals 0, the mean of the boys was 2.3 while the girls' mean was 2.5, standard deviations for each sex being .7. To estimate the reliability of this measure, the correlation between the grade point average for the first semester and that of the second semester was found. After correction the estimated reliability coefficients were .81 for the boys and .76 for the girls.

For the second criterion, 35 teachers who taught tenth grade classes in the school were asked to rate each student they knew in this population on a seven-point scale representing how hard the student tries to coöperate in the classroom. For each sex, 4 represented the average and 7 and 1 indicated respectively the highest and lowest 10 per cent on this trait. Those students in the population who received ratings from at least four teachers, 144 boys and 167 girls, were given scores based on the average of all the ratings they received. The means were 4.6 for the boys and 4.9 for the girls, with a standard deviation of 1.3 for each sex. The reliabilities of these ratings were estimated by correlating the average of the odd numbered ratings for each person with the average of the even numbered ratings when these ratings were listed at random. After correction the estimated reliabilities were .78 for the boys and .76 for the girls. The fact that grades and teacher ratings on coöperation showed correlations of .71 for the boys and .74 for the girls indicates that these two criteria reflect the same kinds of teacher judgments.

D. RESULTS

The correlations between the guess-who ratings, scored by the *CEI* and the weighted method, for identical populations, and the corresponding criteria are indicated in Table 1. In every case the weighted method of scoring these ratings yielded higher validity coefficients although the differences were significant at the .01 level in only three of the four comparisons. In determining the significance of these differences the fact that these correlations were themselves correlated was taken into account. The validity coefficients of the weighted scores, ranging from .74 to .80, were approximately as high as the estimated reliabilities of the criteria. While the reliabilities of the weighted scores were not accurately determined, these validity coefficients are probably slightly below the theoretically possible figures based on the geometric mean of the reliabilities of the two measures being correlated.

TABLE 1
DIFFERENCES IN VALIDITY COEFFICIENTS OF GUESS-WHO RATINGS SCORED BY THE WEIGHTED METHOD AND THE *CEI* METHOD†

Obtained with teacher ratings as validity criteria								
Trait	Sex	*N*	Scoring method	Mean	*SD*	Validity coeff.	Diff. bet. cor-res. *z*'s	Value of *t*
School marks	Boys	155	Weighted	— .5	10.7	.79	.05	.90
			CEI	.7	11.9	.77		
	Girls	177	Weighted	— .1	12.7	.80	.25	4.56*
			CEI	1.3	14.0	.69		
Coöperation with teachers	Boys	144	Weighted	0	7.6	.74	.20	3.93*
			CEI	0	13.1	.63		
	Girls	167	Weighted	.7	7.4	.78	.22	3.77*
			CEI	—1.1	12.1	.68		

†The correlations between the two methods of scoring ranged from .83 to .86, yielding values of r_{rr} ranging from .69 to .76. The values of $S_{z_1 - z_2}$ ranged from .05 to .06.

*Significant at the .01 level.

E. DISCUSSION AND CONCLUSIONS

It is possible that a more precise method of estimating the reliabilities of the measures would reveal a greater discrepancy between the obtained and the theoretically possible validity coefficients. But the results do indicate that guess-who ratings when scored by the proposed method of weighting yield scores which compare, if not almost as high as the reliabilities will permit, at least very favorably with teacher judgments. This conclusion is qualified by the following conditions: (*a*) The traits are not dependent on how widely known a person is by the rating group; (*b*) raters have had considerable opportunity to form the judgments required; and (*c*) those who are mentioned infrequently are excluded from the population. Such agreement of course may reflect the fact that teachers and pupils share the same biases, but the study shows that the bipolarity of guess-who ratings does not necessarily produce results at variance with those obtained from ratings made on a five- or seven-point scale. Under the conditions of this study, the *CEI* method of scoring appears to be less valid than the weighted method.

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ACTIVITY UNDER LOW MOTIVATIONAL LEVELS AS A FUNCTION OF THE METHOD OF MANIPULATING THE DEPRIVATION PERIOD*

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A. PROBLEM

The position frequently taken in many animal learning experiments, that equal periods of deprivation induce equal amounts of motivation during the daily learning periods, has not had experimental verification when motivation has been measured by activity wheel behavior. Thus, it has been shown that albino rats under a 23-hour deprivation—one hour feeding schedule for 21 successive days—increase their activity and presumably their strength of drive up until the 12th to 15th day (3, 4).

Another methodological problem in this general area is related to how deprivation schedules, in which relatively low levels of motivation are required, shall be set up. Examination of experimental situations reveal two diverse procedures. In one situation, the number of hours of food deprivation is controlled by allowing unrestricted eating during the interval from the end of the experimental hour until *h* hours before the next experimental period (1). In the other procedure, the animal is fed for an hour, and then placed in the experimental situation *h* hours following this one hour of feeding (2).

More concretely, if it is desired to place a *S* on five hours of deprivation, one *E* may place his *S* on *ad lib* feeding up until five hours prior to the experiment and then begin the deprivation period. On the other hand, in order to achieve the same end, another *E* may place his *S* on an extended deprivation period—say 23 hours with one hour of feeding. However, the *S* is run five hours after having had the feeding hour.

Our previous work in this area (3, 4) would tend to indicate that these two different methods of manipulating deprivation should result in differing amounts of motivation. Hence, the primary purpose of the present study was to test this hypothesis. More specifically, *S*s deprived of food for five hours during each 24-hour period should show a lower level of activity during their fifth hour of deprivation than those *S*s who are also in their

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fifth hour of deprivation, but who have had access to food for only one hour each day.

B. METHOD

1. *Subjects*

The *S*s were 30 male albino rats, aged 120 to 150 days at the beginning of the experiment. They were obtained from the animal colony of the Pennsylvania State University. Six *S*s from Experimental Group I died, while three had to be eliminated because of a failure of the wheel to operate satisfactorily. As a result, the final *N* was 21 which consisted of 9 Experimental Group I and 12 Experimental Group II animals.

2. *Apparatus and Procedure*

The basic procedure has been described previously (3); as a result, only a brief outline will be presented. The number of activity wheels available necessitated the running of the study in two consecutive sessions in order to provide a suitable *N*. The apparatus consisted of standard Wahmann activity drums equated for frictional torque by the method of Lacey (5). Room temperature, continuously recorded with a thermograph averaged 70.5° F for all periods of both sessions. Temperature never varied more than 3° within any 24-hour period. An automatic switch turned on a 150 w. light bulb which provided the *S*s with 12 hours of illumination (from 6:00 A.M. to 6:00 P.M.) and 12 hours of darkness.

The *S*s were placed in the wheels and given an adaptation period of 14 days. Food and water were continuously available. Immediately following the adaptation period, a 7-day base period was begun. During this period, all *S*s remained on an *ad libitum* water and feeding regimen. At the end of the base period, the animals were randomly divided into two Experimental Groups. The experimental period was then instituted and continued for 15 days. During this period, Experimental Group I was permitted access to food for only one hour each day—from 9:30 A.M. to 10:30 A.M. Experimental Group II was allowed access to food from 3:30 P.M. of one day to 10:30 A.M. of the next. Thus, this schedule provided a total of 23 hours of deprivation for Experimental Group I, and five hours of deprivation for Experimental Group II. Water was continuously available. Although activity was recorded at 8:30 A.M., 9:30 A.M., 2:30 P.M., and 3:30 P.M. during both the base and experimental periods, the readings at 2:30 P.M. and 3:30 P.M. provided the activity records for both groups for the fifth deprivation hour.

C. Results and Discussion

The *S*'s activity, measured from 2:30 P.M. to 3:30 P.M. each day represented the fifth hour of deprivation for both groups, and thus provided the basic data for examination of the hypothesis. Although activity was relatively stable during the base period for each *S*'s 24-hour activity cycle, this was not the case of one hour activity records. Hourly activity showed large inter- and intra-subject variability. Under these circumstances, the general practice of converting each *S*'s activity during the experimental period into a percentage of its base rate was not used. Instead, the actual number of revolutions or gross activity during the experimental period served as the basic data. The base period data did provide, however, a check on the equivalence of activity for this hour for the two groups prior to the introduction of the experimental variable. Use of the Mann-Whitney *U* test for comparison of the gross hourly activity records between the two groups revealed no significant differences.

Each *S*'s mean activity for the fifth deprivation hour for the 15-day experimental period was obtained. For Experimental Group I (23-hour deprivation) it was 220.2 revolutions; for Experimental Group II, it was 45.5. Using the Mann-Whitney *U* test, this difference is significant at beyond the .01 level of confidence. Examination of Figure 1 indicates the day-to-day differences in activity for the two groups.

As would be anticipated, examination of the 24-hour activity cycles for the two groups revealed large differences. Inasmuch as the 24-hour periods provided relatively stable activity levels, it was possible to use the base period against which to plot the experimental data.[1] For the 15-day period, the mean for Experimental Group I was 324.7 while it was just 92.2 for Experimental Group II. Using the Mann-Whitney *U* test, this difference was significant at beyond the .01 level of confidence. Figure 2 presents this material.

When the plots for Experimental Group I are contrasted with other studies which have employed the same procedure under similar conditions, a great deal of similarity in the function of the activity curve is found. Absolute values in the present study, however, are somewhat lower than those previously found, although the presence of 12 hours of light might well account

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[1] The animal's base rate is obtained by totaling the number of recorded revolutions during the seven-day base period and dividing by seven. The animal's activity for each experimental day was divided by the base rate in order to obtain a daily figure expressed in terms of a percentage of the base rate.

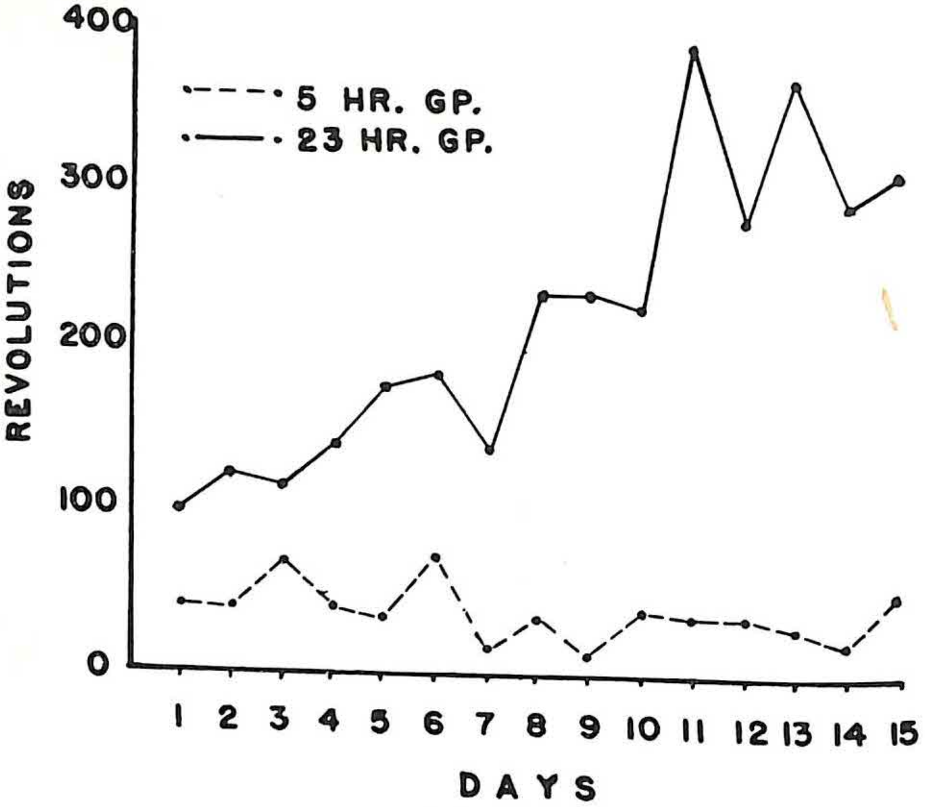

FIGURE 1
MEAN RUNNING ACTIVITY FOR THE FIFTH DEPRIVATION HOUR FOR THE TWO EXPERIMENTAL GROUPS

for this depression of activity. Interestingly enough, the 5-hour deprivation group does not show any increase over the activity indicated during the base period when they were on *ad lib* feeding. Presumably five hours is too short a deprivation period to be reflected in total activity.

The primary findings of the experiment are quite clear. To the extent that activity wheel behavior represents a measure of the albino rat's motivation, our findings provide strong support for the notion that the method of manipulating the deprivation period plays an important rôle in determining strength of drive. Thus, methodological caution is indicated in the comparison of studies in which although the number of hours of deprivation since feeding are equivalent, the total number of deprivation hours per 24-hour period is not.

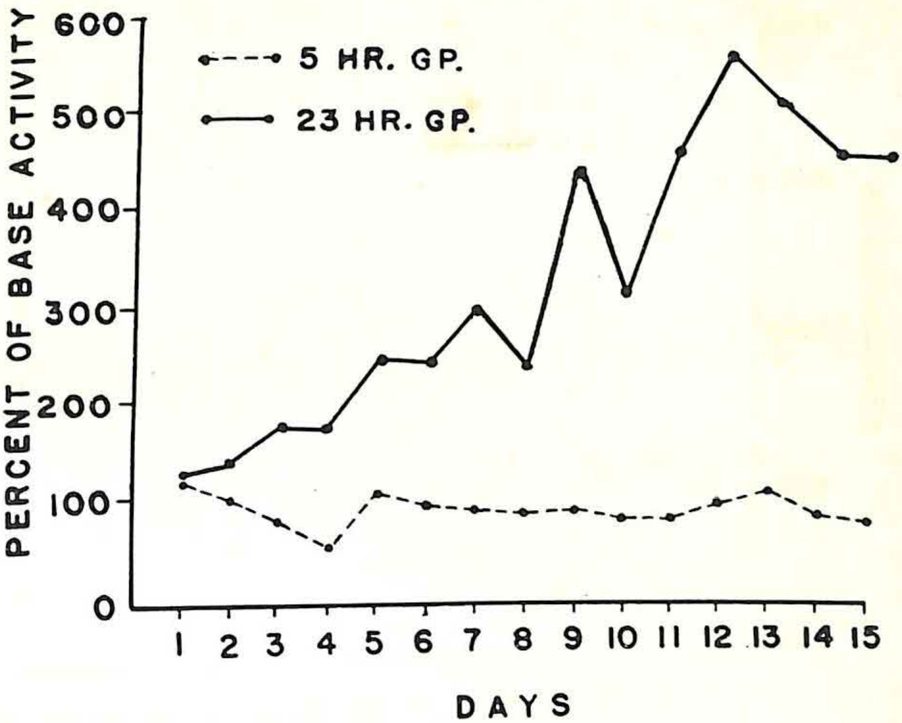

FIGURE 2

MEAN 24-HOUR RUNNING ACTIVITY, IN PERCENTAGE OF BASE RATE, FOR THE TWO EXPERIMENTAL GROUPS

D. SUMMARY

One group of albino rats were placed on a 23-hour deprivation—one hour feeding schedule. A second group was placed on just five hours of deprivation with 19 hours of *ad lib* feeding. The activity for both groups was measured during the fifth deprivation hour. The results indicated significantly greater activity during the fifth hour for the group which had been placed on the 23-hour deprivation schedule.

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SHORT ARTICLES AND NOTES

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CONDITION ANALYSIS: A RESEARCH METHODOLOGY*

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It may be of interest and value to research workers in developmental psychology and allied fields to acquaint themselves with a methodology which may be used as an alternative when the more familiar cross-sectional or longitudinal methodologies are considered inappropriate. Condition analysis, an analogue of a method used quite extensively in physiology and experimental embryology, may be defined as the procedure in which the object of study is presented with the same or equivalent stimulation in a series of differently structured contexts. In contradistinction to the cross-sectional and the longitudinal methods, condition analysis may be undertaken as an independent research method or be used in conjunction with these other better known procedures.

As an independent research method, condition analysis permits a rather high degree of control of experimental variables. For example, a study by this writer (2) employed as subjects a group of preadolescents who were given a single projective instrument, the Rosenzweig Picture-Frustration Study, at repeated intervals of four months in a series of situations that were differently structured. The test was first administered in the regular classroom to the whole group; it was then administered once again in the classroom, however another set of demands was required of the subjects; the test was administered a final time to the whole group at a camp, where the physical, social, and psychological features of the testing context were quite different from those of the previous two test administrations.

This experimental procedure allowed each set of *P-F* responses to be considered in the light of a previous set of responses, the differences between sets resulting in large part from the unique physical, social, and psychological conditions in which the *P-F* was given. The results of the study showed that subjects responded not only to the changes in the structure of situations, but also in some degree to their specific internal tendencies to respond

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within situations regardless of the demands of the situations. Thus, groups of youngsters judged different as to certain predispositions to respond acted differently within the same testing situation—as one might suspect they would. The experimental procedure designated here as condition analysis permitted at one and the same time an evaluation of so-called situational effects on individuals and a differentiation of the special characteristics of individuals which predispose them to respond to situations in definite ways.

When condition analysis is not used as an independent research methodology but as an adjunct to better known procedures, such as the cross-sectional or longitudinal, it can serve to increase possible control in the one and overcome the major limitation of the other. The cross-sectional method, as Anderson has stated, can only hope to approximate the true developmental processes:

> Although the results obtained from successive cross-sections are of great value, they give approximations rather than accurate representations of the developmental process. For example, because children grow at different rates and reach similar developmental levels at different times, a cross-section study places together at the thirteen year level many girls well past puberty and many girls months away from puberty (1, p. 7).

A condition analytical approach in the "pilot" work of a cross-sectional study would no doubt aid in reducing the problem of heterogeneity of subjects by exploring the capacity of these subjects to respond to their environment. One would thus be more likely to achieve more homogeneous groupings of, say, girls in early and late stages of puberty.

Condition analysis bears much resemblance to the longitudinal method, except that change in response is not perceived as a function of time but of situation. The practical limitation of the longitudinal method is loss of subjects with time. It is impossible in most instances to follow the same group of subjects over a long period; some loss has to be expected. One obvious advantage of a condition analysis even within a longitudinal program is that it increases knowledge about the functioning of a subject, his capacity to adapt, at any one time and over a period of time. Loss of any subject may thus have somewhat less serious consequences if knowledge of that subject is in some respects more complete than it would otherwise be in a standard longitudinal procedure of retesting individuals at given intervals with the same tests.

Condition analysis, as stated previously, is a very important method in physiology and experimental embryology, where it has long been the practice to obtain responses from organisms subjected to different environments or stresses. Much of the well-known work of Spemann, Weiss, and Driesch has been based on such a method.

It has been suggested that it is a method which may be used independently or in conjunction with the better known cross-sectional or longitudinal methods. The various steps involved in any condition analytical approach to an experimental problem may be described as follows:

1. Subclassification of a group of subjects along significant dimensions by empirical or clinical means; for example, a breakdown into "bright," "average," and "dull" subgroups in a study of intellectual processes.

2. Selection of a measure or measures to be employed. Such measures should be of a type to which a wide variety of response is possible, such as unstructured projective tests and the like.

3. The evolvement of conditions in which the measure may be administered. If, for example, the measure is a "physical" one (such as the dynamometer), conditions should be constructed which stand a good chance of affecting the strength of the grip. Test runs should indicate whether or not a particular condition would do so. In the same way, appropriate conditions must be developed within which sociological or psychological measuring instruments may be given and to which individuals may respond to some extent in a unique fashion.

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ADULT EDUCATION IS THE PSYCHOLOGIST'S BUSINESS*

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There is no need to belabor the fact that people do not understand themselves and others. Business men are finding that most of their difficulties in lowered production or friction between groups lie in inadequate personalities. Courts dealing with marital difficulties, domestic relations, juvenile delinquency, or crime are tracing the origins of these problems to personality maladjustments. Many evaluators of sources of contention in democracy spot the roots of too-much-leaning on demagogues, in emotionally distorted personalities. Certainly much of the pressure to buy more and more to increase one's self-confidence has its beginnings in built-in anxieties of the early years. Even blocks to reading and learning may be disguised personality problems.

In spite of the prevalence of personality problems in the community many professional psychologists have remained somewhat aloof and disinterested. Some psychologists argue that we must do more research before we can be of help. They tally the number of those in trouble and then evaluate the latter's needs in terms of trained clinical psychologists, psychiatrists, psychiatric social workers, and other specialists. This is as far as they go.

Other psychologists react by denouncing industry for employing unqualified personnel and for relying on not-yet-validated tests. They become irate because pseudo-psychologists are serving the public. They condemn newspapers and magazines for publishing short tests for self-diagnosis of one's abilities and traits. They scorn the "popular psychology teachers" as well as radio and television programs which attempt to offer easy solutions for human problems. Such criticisms, no matter how justified and well-merited, lose their effectiveness if a positive approach is not also offered. Psychologists have already delayed much too long in tackling this problem directly.

Where are the professional psychologists who will venture beyond mere evaluation of problems or criticism of present methods of handling them? Certainly there are psychologists who, by virtue of their training, interest, and professional attitude, can help to furnish some positive approach. One means that such psychologists have at their disposal is adult education. Most

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universities are now offering large numbers of courses in a variety of subjects of interest to the adults in the community. In most subject-matter areas adult educators are busy evaluating community needs and attempting to meet these by offering pertinent courses. At most universities, however, psychology has been slow in assuming its responsibility and developing its possibilities in adult education. As we have indicated elsewhere (1) even where psychology courses are available they are frequently offered by departments other than the psychology department.

If psychologists would extend existing adult education programs, or initiate them if they are not already in existence, it seems that both the students and the profession of psychology would derive benefit. With competent handling, students could be aided in gaining insight into their own personality dynamics. They might be made to see the time-bombs being built into youth by unknowing adults. Courses might help mothers and fathers, husbands and wives, employers and employees, police officials and others to understand the complexities of human motivation and feelings. In addition psychology as a profession would also profit. Students would be led to increased understanding of what psychology is, and what it is trying to do. They would thus be better equipped to know where to get qualified professional service in their community when it is needed. Now many nonpsychologists who are merchandizing our subject are either turning people against it because of unwarranted claims, watering it down so that the word develops into a laughing stock, or presenting quacks and charlatans as psychologists.

It's time for action. Psychologists should stop waiting for more research and start helping more intensively with the resources that are available. Adult education, with its numerous possibilities for courses in child psychology, personality, mental health and the like, is one line of direct positive action which psychologists have at their immediate disposal. They should not neglect it.

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BOOKS

Now that there is a special *APA* journal completely devoted to the publication of book reviews, it is no longer necessary that other journals emphasize such publication. It has always been our conviction that book reviews are a low order of publication unless they carry information that is even more important than the book. However, the publication of book titles is a very important service, and we shall continue to render that service.

In any given issue of this journal, we may continue to publish one or more book reviews, but we do not consider such publication a major function of this journal. In line with this policy, we can no longer pay for such manuscripts.

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REVIEWED BY HARRY C. MAHAN

How best to present the relevant facts and principles of physiology to students who are just beginning the study of psychology is a problem which has been faced by teachers and textbook writers for several generations. Perhaps we should begin by saying that, up to the present time at least, no one, to our knowledge, has reached a satisfactory solution. That proposed by Wenger, Jones, and Jones is to make the second semester introductory psychology course one in physiological psychology. Their suggestion has been accepted to the extent that their course, or one equivalent to it, is now a prerequisite for upper division psychology courses at the University of California at Los Angeles. This requirement applies not only to students taking their introductory courses at U.C.L.A., but also to those transferring to U.C.L.A. after having graduated from one of the many junior colleges[1] in Southern California. The book under present consideration, which is an outgrowth of the authors' course, is not only the only text in its field which has been designed specifically for beginning students, but is the only one in physiological psychology with a copyright date since 1950. It is not, then, just another book in physiological psychology; it represents a major change in curriculum construction affecting thousands of students and many psychology departments. It is therefore the purpose of this review to subject it to a somewhat more critical appraisal than might be justifiable in ordinary cases.

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[1] The 34 junior colleges of the Southern California Junior College Association have a combined enrollment of approximately 50,000 students. These colleges are virtually obliged to offer courses which are prerequisites for upper division work at the University of California, particularly in such popular areas as psychology.

It may occur to many that if an understanding of the biology of behavior is essential to students majoring in psychology, they might be well advised to take at least one semester of physiology, anatomy, or some other course offered by the biology department. This would permit them to approach physiological psychology at the relatively advanced level of such texts as that by Morgan and Stellar for example. That the present authors disagree with this sequence is indicated by their statements that "few teachers of psychology would be satisfied with the emphasis upon structures and functions common to most textbooks in physiology," and "would hold that only a part of the traditional physiology is germane to the study of psychology."

The first of these two statements can be true only if by it is meant that the emphasis upon structures and functions is to be at the expense of the student's psychological perspective, a situation which is hardly likely to prevail with students who take further courses in the psychology department. On the surface, the second appears to be more plausible, at least in the abstract form in which it is presented. It is often impossible, however, to distinguish in advance between those areas of physiology which are "germane to the study of psychology" and those which are not, for unsolved problems have a way of extending their ramifications in directions which have seldom been anticipated. A case in point is that of phenylpyruvic oligophrenia (8), in which failure in the metabolic conversion of an amino acid has a direct and important bearing upon intelligence. Any lower division text, therefore, which purports to provide the student with a breadth of background essential for his future studies, and at the same time narrows the range of traditional instruction, places the burden of proof of curriculum improvement squarely upon the shoulders of its authors. In the present case, if certain areas of physiology have been omitted, we have a right to question the justification, and to evaluate the relative merit of whatever has been offered as a substitution.

As one looks through upper division texts in such courses as child psychology, experimental psychology, comparative psychology, clinical psychology, abnormal psychology, and others, he finds that there is relatively little in the standard course in college physiology (12) from which the student can fail to benefit in acquiring a background. This is particularly true if "the major emphasis is to be upon the functions of organisms," as Wenger, Jones, and Jones have recommended in their preface. In examining the table of contents of the present text, therefore, it is surprising to note the significance of some of the omissions. We had always been led to believe, for example, that if one is to claim even a superficial understanding of the physiology of emotion, he must be familiar with the effects of emotional stimuli on the circulatory, respiratory, and digestive systems. In a book written for popular consumption (and, incidentally, one which students enjoy reading), Schindler (13) has pointed out that even the integumentary system is of considerable importance. The student who looks in Wenger, Jones, and Jones for a description of these systems or the behavior in which they play a part will, however, be doomed to disappointment, for no mention is made of them whatsoever.

Among other biological topics with which it would also seem desirable for the student majoring in psychology to have some familiarity, but which are neither described nor illustrated in the present volume, are human reproduction and heredity. If the authors' course is to be taken in lieu of physiology, where is the student to obtain his background in these important areas? This they do not tell us.

Further study of the table of contents indicates that, with the exception of one chapter on "contractive cells and muscle action" (13 pages), and another devoted to "secreting cells and chemical integration" (14 pages), the "major emphasis upon the functions of organisms" which the authors advocate boils down to a discussion of the nervous system. Even here, out of a total of some 248 pages devoted to this system, 164 are concerned with the functions of the sense organs. The remainder is divided among the central nervous system (53 pages), the autonomic system (14 pages), and nerve cells and conduction (17 pages). This apparently is the type of "biological background" which Wenger, Jones, and Jones consider more essential for students of psychology than that which might be obtained by taking a standard course in college physiology. It would seem to this reviewer that no further comment on this particular aspect of the book is necessary.

Chapter 22, entitled "Psychosomatic Problems" is devoted, in part at least, to a discussion of physiological-psychological relationships. It is here that we can determine whether the psychological orientation of the authors is that of modern objective psychology, or is based upon the now obsolescent dualism of an earlier generation of physiological psychology writers. Interestingly enough, this is the only chapter for which no references are given in the bibliographical appendix, and the only three which are listed at the end of the chapter are by Alexander (1), Dunbar (4), and Grinker (7), none of whom is a psychologist, and two of whom are psychoanalysts. The authors begin this chapter as follows:

> In this text we have held that the term "mind" has little meaning for contemporary psychology apart from the activities of one of the bodily organs, the cerebral cortex. We have seen that through this remarkable bit of cortical tissue, when it is adequately nourished and not interfered with by other bodily functions, we are able to do some rather astonishing things. We become aware of our external environment and aware of some aspects of our bodily states and functions; we remember and learn, and thus are able to control many of our bodily functions and many aspects of our environment; we develop concepts for both concrete objects and abstract symbols; and, finally, we utilize these concepts and other memories in various manners which we call thought, imagination, ideation or reminiscence. All of these activities, of course, are called "mental." If we are aware of them, they are called "conscious." If we are unaware of them, they are called "unconscious." But so far as we know, *all essentially are activities of the cerebral cortex* (italics mine) (p. 360).

Here, then, is the crux of Wenger, Jones, and Jones' position: the brain is the organ of the mind. For them it has the traditional dualistic function originally suggested by Spinoza (16), which differentiates it from any other organ of the body. To their way of thinking, cortical tissue is not simply biological material which conducts and integrates impulses of an electrochemical nature, but its "activities" include such things as awareness, learning, remembering, imagining, and thinking. They continue in the same section:

> If one wishes to consider the effects of mental activity upon *other parts of the body* (italics mine), or the effects of certain bodily functions upon mental activity, he may do so as legitimately as he may study the effect of the heart rate upon exercise tolerance. True, his methods of study will vary according to his problem, but in each instance he is measuring the influence of one bodily function upon another (p. 360).

Thus is all psychological activity reduced, in the last analysis at least, not to the functioning of the organism as a whole, not to the functioning of the neuro-muscular-endocrine system as a whole, not to the functioning of the nervous system, nor even to the function of the brain-as-an-organ, but to "this remarkable bit of cortical tissue," the cerebral cortex!

The authors use this same reductionist approach, although this time referring to a different section of the body, in their pre-Cannon (3, p. 79), and apparently original, definition of emotion:

> Emotion *is* (italics mine) activity and reactivity of the tissues and organs innervated by the autonomic nervous system. It may involve, but does not necessarily involve, skeletal muscular response or mental activity (p. 343).

Although it might be concluded from the first two passages quoted above that Wenger, Jones, and Jones are confirmed cerebralists, who believe that psychological activity can be described only in terms of cortical functioning, this is found to be anything but the case in their discussion of sensation. Here they accept completely, and apparently without question, the mentalistic (psychic) constructs of classical structural psychology:

> In some psychology theories, sensation has also been a construct, an element of consciousness derived from the mere functioning of the afferent system to which other elements are added to make a perception. In actual practice, one never experiences a sensation, but only relatively simple perceptions (p. 65). . . . A sensation can never be described in physical terms; such a statement is meaningless (p. 69). . . . It is of some interest to inquire into the possible physiological correlates for these psychological dimensions. . . . You already know that quality *resides* (italics mine) in the organism. . . . We have not yet solved the more difficult problem of qualitative differences within a single sense department, red and blue perhaps *occurring* (italics mine) at different depths of the cortical layers of the occipital lobe (p. 73).

Although it is true, as Wenger, Jones, and Jones point out, that "the so-called mind-body problem hardly exists for psychology today," they have only heard about, without becoming acquainted with, its solution. There is no evidence whatsoever in the present volume to indicate that twentieth century psychological theory has successfully demonstrated that Cartesian dualism is not only unnecessary, but is a downright handicap to scientific work in physiological psychology.

It was hoped following the publication of Kantor's (11) monumental work on the history of the subject in 1947, that future workers in physiological psychology might avoid some of the postulational errors which had characterized so many previous investigations. Although this book, which was written especially for textbook authors and research workers, is listed under Physiological Psychology in the Harvard List of Books in Psychology, it has somehow escaped Wenger, Jones, and Jones' attention. This oversight is perhaps somewhat less surprising when it is noted that they have apparently also ignored the findings and conclusions of such outstanding investigators as Sherrington (14), Cannon (2, 3), Goldstein (6), Freeman and Watts (5), Weisenberg and McBride (17), Skinner (15), Wertham and Wertham (18), and Wolf and Wolff (19).

Whether textbook writers agree with authorities in their field of specialization or not, they owe it to their students, to their colleagues, and to their fellow writers to acquaint themselves with and take into consideration all important contributions to the literature. Even many undergraduate students are now aware that when interbehavioral principles are applied to the problems of physiological psychology, the necessity for such constructs as psychic elements and dual functioning cortical tissues disappears automatically. Modern psychological theory (9, 10) considers neural and other biological functions as participating parts of larger field events, rather than as physiological concomitants of or substitutes for mental (psychic) action. The notion of the cerebral cortex as any more "remarkable" than any other bodily tissue is discarded immediately, except perhaps as it plays a part in highly complex and integrated conduction processes.

Perhaps the most serious criticism of this book is with respect to the state of confusion in which it is likely to leave the thinking student. After his having been told in the first semester course that psychology is an independent science, he is now informed that if he is to study real events in nature, he must confine his observations to physiological functions. Of course he is not likely to believe this, any more than Wundt did, but it is not a particularly constructive way to start him on an academic career as a major in psychology. It is difficult for this reviewer to understand why anyone who is teaching psychology at the present stage of its scientific development should deny the very existence of psychological data as concrete, observable, temporal events in nature. To insist, for example, that acts of remembering are nothing more than the functioning of cerebral tissue, is to deny the scientific respectability of research studies in this field from Ebbinghaus to Bartlett. Paradoxically enough, it is the neurologist who must depend upon his psychological associate for an evaluation of the changes in behavior which may accompany central nervous system disease or accident. The observations of both investigators may be equally objective and scientifically acceptable. Psychology seems to enjoy greater respect from other sciences than some of its own members are willing to accord it, but if it is ever to "come of age" it must outgrow the habit of apologizing for its data by pretending that they are basically physiological. By persisting in this, it is not only handicapping its own development, but is doing its sister science of physiology a gross disservice.

In conclusion, it should be stated that we agree with Wenger, Jones, and Jones in their contention that a course in physiological psychology is desirable as a second semester offering for students who plan to major in psychology. Such a course should, however, not only provide the student with a broad background in those aspects of biology which are relevant to his future courses in psychology, but it should emphasize a theoretical approach which can coördinate psychological and physiological constructs in such a way as to give them equal scientific status. Such an approach is not, as has been pointed out (11), to be found in the literature of traditional physiological psychology, but it is readily available for those who care to use it. Unfortunately, the present volume fails to meet the needs of such a course, and, when its physiological and psychological deficiencies are cumulated, it can be described only as extremely disappointing. It is the considered opinion of this reviewer that its required usage by a substantial portion of all students of psychology in Southern California is one of the longest steps backward which academic psychology has taken for a considerable period.

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INTERESTS AND LEADERSHIP AMONG ADOLESCENTS*

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A. INTRODUCTORY

The problems of leadership are as old as human association. They have been studied from diverse approaches beginning both at the individual and at the group. This present study is an attempt to study leadership in relation to a variable which may stand between the deeply personal attributes of the self and the more impersonal demands of the group, the variable of interests and activities.[1]

Gouldner, in a survey (4) of studies on leadership, suggests that there have been two principal explanations of the leader, that of the trait theorists and that of the situationists. The first group would seek the "why" of leadership in the personal traits of the leader. The studies summarized by Stogdill (10) are mostly of this type, attempts to relate the fact of leadership with the personological characteristics of the leader. The situationists, drawn often from the ranks of sociology and social psychology, are more interested in studying what Murphy (8) calls the leadership process than in studying leaders as such. Though formerly they were content to indicate the descriptive variability of leadership patterns in different situations, more recent studies, such as those of Goldberg (3) and of Shears (9), have shown the changes in leadership behavior which result from experimental manipulation of group structure.

The interests of leaders may be one way their personal traits can be linked with the group activities which the situationists would investigate. Darley (2) and Tyler (11) have shown that differences in Strong Vocational Interest patterns are associated with differences in measures of attitudes, values, and adjustment. On the other hand, interests are the beginnings of activity; they express themselves in acts and behavior which are a social stimulus for others. They become, as Carter (1) shows, a means of identification with a group. The interests of the leader then can be thought of as reaching inward to his most generalized ways of behaving and as reaching outward toward his relations with the group of which he is a member.

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[1] The results presented in this paper are part of a research investigation completed in partial satisfaction of the requirements for the degree of Doctor of Philosophy at the University of California. The author wishes to thank the members of his committee, particularly Professors Read D. Tuddenham and Harold E. Jones, for their advice and help.

B. METHODS

1. *Subjects*

The present investigation is based on data derived from almost the entire population of a community high school in the San Francisco Bay Area. Seven hundred fifteen students, from the eighth to twelfth grades inclusive, participated in the testing. About 120 enrollees had to be omitted from the test group because of absence on the testing days or because of scheduling difficulties.

The community served by this school is largely a residential one, suburban to the San Francisco satellite cities of the East Bay, though it does contain some light industry. It is relatively homogeneous in socio-economic status with most of its population living in areas rated at about the middle of the range represented in the Wann (12) classification of Bay Area census tracts.

2. *Test Instruments, Scores, and Hypotheses*

Testing was accomplished at the school during the regular English periods. The student subjects were given two tests, a "Student Interest Questionnaire" and a sociometric "School Friend Questionnaire." The first was adapted from the Interest Inventory developed by Mary C. Jones (6) at the University of California Institute of Child Welfare and consisted of 200 interest items arranged under the headings of "Places to Go," "Things to Do," "Occupations," "Things to Talk About," and "Magazines to Read." A three-way response set of "Like," "Indifferent," and "Dislike" was provided for on the *IBM* answer sheets used to record responses. The second test, a sociometric questionnaire, was designed to discover the friendship groupings within the school and to obtain peer ratings on the subjects. Scores were derived both in terms of choices (or "votes") given and in terms of choices received. Scores from this sociometric test include acceptability (votes received in response to an item "Who are your best friends here at school?"), acceptance (votes given on this same item), athletic leadership (votes received on "If you were on a ball team made up of friends of yours whom would you like to have as team captain?"), attractiveness (votes received on "Name those you would like to be more friendly with"), attracted (votes given on this item), friendliness (votes received on "Who seems very friendly to people?"), popularity ("Who are the ones everyone seems to like?"), prestige ("Whom would you like to have represent your school at a student conference?"), prominence ("Who are the big wheels among the students?"), rejections received (votes received on "Name those you would not particularly care to be friendly with"), rejections given (votes given on this item) and style setting ("Whom do you know who think up original things to wear, say, or do that seem to catch on with the others?").

From the interest questionnaire a number of scores were derived.

1. "Like," "Indifferent," and "Dislike" scores were calculated in the hope that, following Lorge (7), they might have personological correlates, by simply summing the number of such responses given by each subject.

2. Non-conformity scores were intended to measure the extent to which a subject deviated in his interest test behavior from the other members of his sex in his own grade. Ten scales of 42 items each were made up, one for each sex in each of the five grades, by taking the 14 most infrequent "Like" responses, the 14 most infrequent "Indifferent" responses, and the 14 most infrequent "Dislike" responses for each of the sex-grade groups. This score was calculated in order to test the hypothesis that leaders were conformers to group norms.

3. Two interest maturity scales, one for each sex, were developed by finding responses which appeared to increase significantly and consistently from eighth to twelfth grades. These maturity scales consisted of 43 items for the boys and 37 items for the girls. The hypothesis was made that leaders would tend to be more mature than followers in their interests.

4. Content scales were constructed, based on the agreement of three judges, of items to which a "Like" response could be considered indicative of interest in a specific content area. The nine content scales include adventure interests, athletic interests, heterosexual interests (interests in contacts with the opposite sex), intellectual-cultural interests, mechanical-constructive interests, scientific interests, social interests, passive spectator interests, and a group of interests likely to be disapproved of by adults which were termed "delinquent" interests. Some items would naturally appear on several scales. An example is liking to go to parties which appears in both the heterosexual and social scales. Since all these content scores can be inflated by a "Like" response tendency, a measure of the relative importance of the various content categories, uncorrected for length of scales, was obtained by dividing each individual's raw scores by his "Like" score and multiplying by 100. The resulting adjusted scores are the ones which were used in all comparisons discussed here.

Fifty-four of the subjects were retested with the Interest Questionnaire five weeks after the first administration. The test-retest reliabilities of the interest scales are shown, together with the number of items in the scales in Table 1. It will be seen that all the scales have satisfactory reliabilities except for that of non-conformity. It may be that this scale, whose score distribution is strongly positively skewed, in addition to measuring non-conformity to peer standards, may also, like the *F* scale of the *MMPI*, indicate inattention or carelessness in taking the test and this carelessness might be expected to be relatively unstable in time.

TABLE 1
TEST-RETEST RELIABILITY COEFFICIENTS, NUMBER OF ITEMS, AND SAMPLE ITEMS OF THE INTEREST TEST SCALES

Scale	Number of testees	*r*	Number of Items in scale	Sample Item (Response direction in paren.)
Like	54	.91	200	Any item (L)
Indifferent	54	.76	200	Any item (I)
Dislike	54	.87	200	Any item (D)
Non-Conformity	54	.53	42	Be a poet (L)
Maturity (Boys)	25	.79	43	Sail a boat (I)
Maturity (Girls)	29	.86	37	Sew (D)
Adventure	54	.86	23	Climb a mountain (L)
Athletic	54	.88	19	Play baseball (L)
"Delinquent"	54	.86	13	Smoke (L)
Heterosexual	54	.78	12	Go to a formal dance (L)
Intellectual-Cultural	54	.87	34	Talk about art (L)
Mechanical-Constructive	54	.70	24	Be a carpenter (L)
Science	54	.85	15	Study birds (L)
Social	54	.84	46	Picnic (L)
Spectator	54	.82	20	Go to movies (L)

3. *The Selection of Leaders*

This investigation studied face-to-face leaders within the total sample. It was not desired to study holders of leadership positions, the "headmen." Neither was it desired to study those with generalized prestige or prominence in the school, those who were seen as the "big wheels." Rather it was hoped that, from the naturally occurring informal social groupings among the students, the persons who were seen as leaders or as influential by the other group members could be distinguished from the followers. Thus there might be some cliques composed of persons with great prestige but within this clique one member might exercise the most leadership. Similarly another clique of low prestige members might have a member, scarcely seen as a leader by his classmates as a whole, who, nevertheless, effectively exercised leadership within the clique. It was this kind of direct, non-institutionalized, face-to-face leadership that it was desired to study. Again since it was desired to distinguish between leadership and general social acceptability leaders were compared with other members of their cliques rather than with persons who were seen as both without influence *and* without close friends.

Two steps were involved in the differentiation of leaders and followers: the delineation of friendship cliques and the identification of clique leaders.

Cliques were delineated by means of the "Best Friends" item of the sociometric questionnaire. The following standards were used:

1. A clique is a group of three or more individuals, each of whom is joined to the clique structure by at least two reciprocal choices or by one reciprocal choice and two unreciprocated ones. Thus there is some degree of reciprocity in all cases and at least four choices will be involved.
2. About one-seventh of the subjects, perhaps threatened by the sociometric questions, failed satisfactorily to complete the "Best Friends" item. Since reciprocity was here impossible these non-responders are included in cliques from which they received choices from at least two clique members.
3. Structures which may be split in two by division at one individual constitute two cliques. The "bridge individuals" are assigned to the clique from which they receive the largest number of choices in proportion to the total number of choices made within each clique.

Using these standards 91 boys from the sample were seen to be organized into 21 cliques of three to eight members, while 136 girls were organized into 28 cliques of three to 10 members.

The identification of clique leaders and of extreme followers involved four sociometric scores:

1. The clique leadership score which was the number of mentions received from members of own clique on the item "Who are the leaders in your own bunch at school?"
2. The all-judges leadership score which was the number of mentions received from all subjects, regardless of clique membership, on this leadership item.
3. The clique influence scores which was the net influence score (votes received on an item "Who usually have good ideas about things to do and places to go?" minus votes on "Who seldom have ideas about things to do?") when only the mentions by own clique are taken into account.
4. The all-judges influence score which was the net influence score derived when all subjects' votes were used. It should be noted that these influence scores were intended as measures of the actual operations of leadership.

The clique leader and the extreme follower were chosen by these four scores. First the clique leadership scores were usd. Ties for high and low position were resolved by means of the all-judges leadership score. Remaining ties were resolved by the clique influence score, or, this failing, by the all-judges influence score. In cases where there were ties for the least influential follower position the average test scores of the tied individuals were used in the comparison with the leader of that clique.

It became clear that there was great variability in the extent to which cliques were organized on the basis of leadership. Some cliques showed a clear differentiation between leaders and followers—the difference between the clique leadership scores of leader and follower was at least two votes—while in others this differentiation was not as sharp. Eight of the boy clique leaders and 15 of the girls met this two-vote-difference criterion. They will be referred to as the "well-differentiated leaders" in the discussion which follows.

C. Results

The 21 boy clique leaders and the 28 girl clique leaders were compared with the extreme follower in each clique in terms of 26 interest and sociometric scores. These scores can be divided into three groups, two groups (interest scores and sociometric behavior scores) being based on the subjects' own test behavior and the last group being based on the ratings made of him by his peers. The results are shown in Table 2.

The leader-follower differences are greatest in terms of the peer ratings and least in terms of the subjects' own behavior on the two tests. Seven of the nine peer rating scores show significant (probability below .05) leader-follower differences for at least one of the two sexes. The girl leaders just miss being seen as more acceptable and as more friendly significantly more often than their followers but they are significantly higher than followers in athletic leadership, attractiveness, popularity, prestige, prominence, and style setting. Boy leaders are significantly higher than their followers in their acceptability, athletic leadership, popularity, and prominence scores. There are no significant differences between leaders and their followers in their sociometric behavior scores. Boy leaders show more social interests than their followers while girl leaders score higher in scientific interests than their followers. The other interest differences do not reach statistical significance. The hypothesis that leaders might be more conforming to group norms than are followers is not substantiated by the non-conformity scores. What tendency appears is in the other direction. The boy leaders tend to have higher (chance probability <.10) non-conformity scores than their followers while the well-differentiated girl leaders show significantly (probability <.05) higher interest non-conformity than do theirs. There is no significant difference between leaders and followers in the maturity of their interests, so the hypothesis that leaders would be more mature is not borne out in this sample.

TABLE 2

t-VALUES OF DIFFERENCES BETWEEN LEADERS AND FOLLOWERS WITHIN CLIQUES

Score	Boys *t*	(DF 20) P	Girls *t*	(DF 27) P
Interest				
Like	.43	>.50	1.32	<.20
Indifferent	.40	>.50	—1.21*	<.30
Dislike	.90	<.40	.05	>.50
Non-Conformity	1.78	<.10	— .45	>.50
Maturity	.82	<.50	.93	<.40
Adventure	.64	>.50	1.31	<.20
Athletic	0	>.50	— .23	>.50
"Delinquent"	.13	>.50	.51	>.50
Heterosexual	1.45	<.20	—1.46	<.20
Intellectual	.77	<.50	.49	>.50
Mechanical	—1.76	<.10	.79	<.50
Scientific	.31	>.50	2.30	<.05
Social	2.56	<.02	— .82	<.50
Spectator	—1.46	<.20	— .78	<.50
Sociometric Behavior				
Acceptance	.46	>.50	.45	>.50
Attracted	1.44	<.20	.25	>.50
Rejections given	—.69	<.50	— .90	<.40
Sociometric Peer Ratings				
Acceptability	3.64	<.01	1.90	<.10
Athletic leadership	2.13	<.05	3.35	<.01
Attractiveness	.78	<.50	3.17	<.01
Friendliness	1.68	<.20	1.92	<.10
Popularity	3.93	<.001	2.77	<.01
Prestige	.98	<.40	3.50	<.01
Prominence	2.21	<.05	3.81	<.001
Rejections received	.62	>.50	.62	>.50
Style setting	.90	<.40	3.43	<.01

*A negative value of *t* indicates lower mean score for leaders than for followers.

D. DISCUSSION

In the differences whose significance is evaluated in Table 2 the contrast between measures of the leaders' own behavior and the peer ratings which they receive is most striking. As seen by their fellows, leaders are significantly different from followers within their cliques. As measured by their own sociometric behavior or by their expressed interests, the leader-follower differences are largely non-significant. In other words, it would seem that many of the characteristics of leaders are more sensitively measured by the reactions of their fellows than by tests. The reactions of others to the leader as a social stimulus are quite marked, but it is difficult from the sociometric and interest behavior of the leaders to say what it is that causes these marked reactions.

One thing which emerges from the results is a difference in the patterning of the scores of boy and girl leaders. Apparently there are somewhat distinct styles of leadership in the two sexes. In the sociometric ratings it will be noted that, relative to followers, boy leaders are more apt to be named as "best friend" (the acceptability score) than are the girl leaders.[2] Apparently the girl leader is not preëminently seen as one to be counted as an intimate. She is, on the other hand, more than the boy leader a person whom others would want to be friends with (the attractiveness score), as one who, more than the boy leader, has a flair for setting styles and has generalized prestige within the school community. The girl leader seems, relative to her follower, more distant and unattainable, the cool "big wheel." The boy leader, compared to his follower, is warmer, the "one everyone seems to like," the "good guy." The fact that boy leaders are consistently ahead of followers on their social interests while girl leaders exceed theirs in scientific interests seems consonant with this interpretation.

The interest content scores may be profitably examined in the light of this difference of leadership styles between boys and girls. For all the clique members (91 boys and 136 girls) boys were significantly (chance probability $<.001$) higher than the girls in adventure, athletic, "delinquent," mechanical-constructive, and scientific interest scores. The girls were significantly higher on heterosexual, intellectual-cultural, and social interests. Now if all the leader-follower interest differences shown in Table 2 whose chance probability is less than .20 are surveyed it will be seen that leaders tend to differ from followers in the direction of the interest patterns of the opposite sex. This is true of adventure, heterosexual and scientific interests among the girls, and it is true for heterosexual, mechanical, and social interests among the boys. (Among the well-differentiated boy leaders the tendency to evince fewer mechanical interests than their followers reaches statistical significance.) It would seem that leaders of both sexes are less bound by the stereotypes of their sex. Girl leaders show perhaps more masculine factuality than do their followers while boy leaders show more feminine sociability than do theirs. That the boy leader is nowise effeminate is suggested by the athletic interest scores of the well-differentiated leaders which are significantly higher than those of their followers.

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[2] It is interesting to note that there is no significant difference between leaders and followers in the number of rejections received. Apparently leaders are just as likely to be rejected as friends as are followers.

It is of interest that leaders in this sample are not shown to be, as Homans (5) suggests, bound to support group norms more than their followers are. It may be true that they must uphold group standards of fair interpersonal dealings but their adherence to this kind of norm must not be interpreted as all-around conformity. The present data suggest that leaders might even tend to be *more* deviant from group norms than are followers; testwise they show interest behavior which is shown by few of their peers. Actually this is not too difficult to understand: leaders would have to be somewhat deviant if they were to bring something new to the group. Deviation from the group norms is a socially dangerous practice; among the boys as a whole there is a significant negative correlation between non-conformity and acceptability scores. But the leaders have apparently learned to profit by the right amount of non-conformity.

E. Summary

Seven hundred and thirty high school students were given an interest test and a sociometric questionnaire. The interest test consisted of 200 items which could be responded to by one of three alternatives: Like, Indifferent, or Dislike. The scores derived from this test include response tendency scores of the number of Like, Indifferent, and Dislike responses, empirically derived scores of interest maturity and of non-conformity to the norms of a subject's own grade and sex, and scores of interest content based on scales derived from agreement of judges as to what items were expressive of adventure, adult-disapproved, athletic, heterosexual, intellectual, mechanical, scientific, social, and spectator interests. The sociometric questionnaire asked for friendship choices and for peer ratings. Scores were derived from the subjects' own behavior in accepting, rejecting, and being attracted to classmates, and from the peer votes which they received for athletic leadership, friendliness, acceptability, unacceptability, attractiveness, prominence, leadership, influence, popularity, style-setting, and prestige.

Cliques were delineated by means of criteria based on the number and reciprocity of choices. A leader and a follower were selected from each of the 21 boys' cliques and the 28 girls' by means of the leadership and influence scores. Comparison of leaders with followers within the cliques shows girl leaders significantly higher in science interests, athletic leadership, attractiveness, popularity, prestige, prominence, and style setting, while the

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boy leaders show significantly higher social interests than their clique followers and are rated higher in acceptability, athletic leadership, popularity, and prominence. Leaders in general seem to be much more sensitively distinguished from followers by the social responses of others to them than by their sociometric or interest test behavior. It is suggested that there are important sex differences in styles of leadership in this sample with the boy leader showing "good guy" qualities which distinguish him from his followers while the girl leader shows "big wheel" characteristics which distinguish her from hers. Leaders do not follow the norms of the group to the extent of being conformists and may actually be more deviant in their interest behavior than are followers.

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LASTING EFFECTS OF ALCOHOL ON THE REDUCTION OF ANXIETY IN RATS*

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A. PROBLEM

A number of experiments have indicated that alcohol reduces anxiety in animals in approach—avoidance situations (1, 2). An important consideration is whether alcohol brings about a diminution in the visceral and motor components associated with anxiety only as long as it is within the system of the organism or whether alcohol effects a relatively permanent reduction in the anxiety-producing properties of the external stimulus situation. To the knowledge of the writer no experimental evidence is available on this question. This experiment was designed to test the hypothesis that alcohol brings about a relatively permanent reduction in the anxiety-producing properties of the external stimulus situation.

B. METHOD

1. *Subjects*

A group of 18 male hooded rats between four and six months of age was used in the experiment. The *S*s were from the colony of DePauw University and were experimentally naïve. Food and water were present in the cages at all times throughout the experiment.

2. *Apparatus*

A Skinner box modified for shock was used. The inside dimensions of this shock box, in inches, were 11⅝ by 8⅜ by 8¼. The sides of the box were painted flat black and the lid was made of transparent plastic. A plastic lever, painted white, extended from a height of six inches on one side at about a 45 degree angle and reached to within one inch of the grid floor. Eighty volts *AC* were available at all points of the grid. A one-eighth inch depression of the lever served to disconnect the grid and complete the circuit to an electric timer.

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[1] The author wishes to acknowledge the contribution of Bernita L. Brown and Judith M. Wheaton, students in the Department of Psychology at DePauw University.

C. Procedure

In the experiment the *S*s were given sixteen training trials, five test trials, five extinction trials, and five relearning trials.

1. *Training Trials*

Following a 12-day gentling period, each *S* was given a two-minute training trial twice a day for eight days. The *S* was placed in the box, the lid fastened, and then the shock was turned on. At the end of the two-minute period the *S* was placed in an isolation cage until the next trial. Approximately one hour elapsed between trials. The amount of time each *S* depressed the bar was automatically timed with the electric timer and these measures were recorded. Each of the experimenters handled the same *S*s on alternate days. The *S*s were divided into two groups based upon their performance on the training trials. The two groups were individually matched according to the mean performance of each *S*.

2. *Test Trials*

During the test trials the *S*s received the same treatment they received in the training trials except that (*a*) one half received alcohol injections and the other half water injections; (*b*) each *S* was given one two-minute *shockless* trial per day for five days.

Each *S* in the alcohol group was injected intraperitoneally with a 10% solution of ethyl alcohol just prior to each test trial. They were given a 1.5 cc total solution per 100 grams of body weight. Immediately following the injection the *S* was placed on the gentling table for four minutes, then placed in the shock box. The *S*s in the water group were treated in the same manner except they received distilled water injections.

3. *Extinction Trials*

The *S*s received the same treatment accorded them in the test trials except that both groups were injected with water. These five extinction trials were started after a delay of 72 hours.

4. *Relearning Trials*

The training trials were repeated with the same amount of shock present in the grid (80 volts *AC*). Each *S* was given five trials, receiving only one trial the third day.

D. Results and Discussion

1. *Training Trials*

After the *S*s had been placed into matched groups the mean times of bar depression for the two groups in the training trials were very similar with a difference of only .02 seconds. For the 16 training trials the mean number of seconds the alcohol group remained on the bar was 84.51 seconds and the mean number of seconds for the water group was 84.49 seconds.

2. *Test Trials*

In the test trials, where no shock was given and one-half of the *S*s received alcohol injections and the other half water injections, the mean difference in the time the two groups of *S*s spent in bar pressing was significant beyond the .01 level of confidence with the water group spending the greater amount of time on the bar (see Table 1). Figure 1 shows the small amount of time that the alcohol group spent on the bar. The water group showed some decrease in the time spent on the bar but maintained a consistent average which was significantly above the alcohol group. These data corroborate the

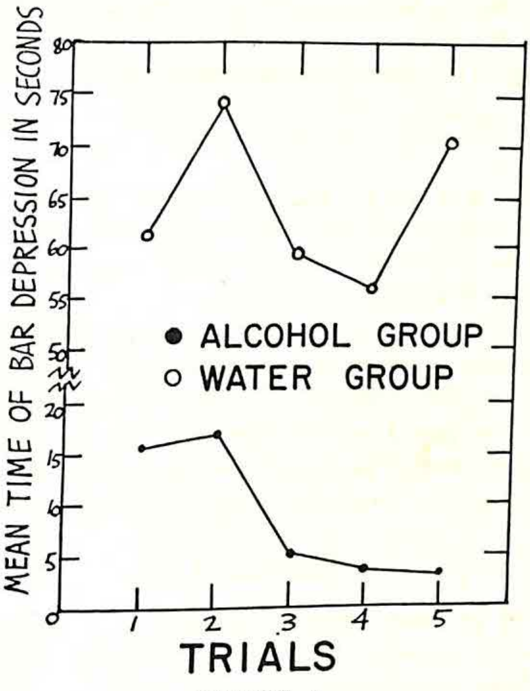

FIGURE 1

results of the experiments of Conger and Masserman (1, 2) which show alcohol does have fear-reducing qualities.

TABLE 1
MEAN PERFORMANCE FOR TEST, EXTINCTION, AND RELEARNING TRIALS
(N = 9 per group)

Condition of trials	Mean of alcohol group	Mean of water group	σM_D	t	P
Test	9.38	66.64	10.05	5.70	.01
Extinction	4.40	35.84	8.59	3.66	.01
Relearning	111.09	111.77	2.60	.26	NS

NOTE: The matched t test was used.

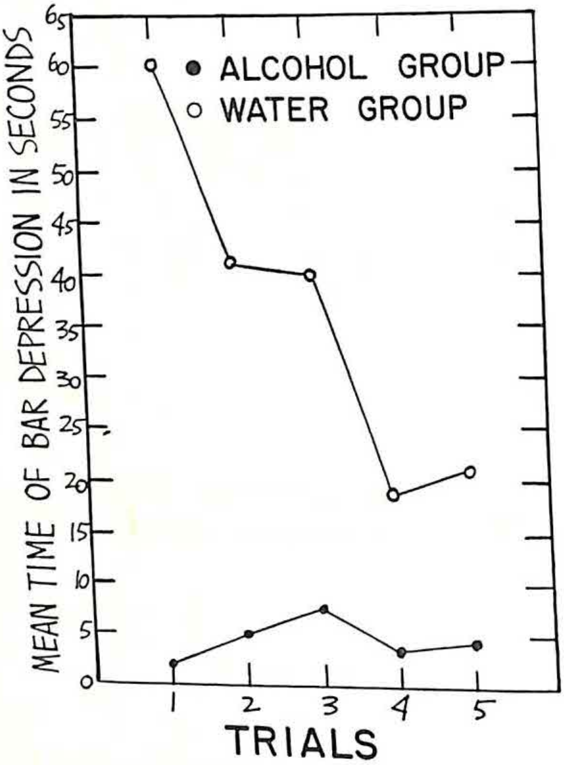

FIGURE 2

3. *Extinction Trials*

In Table 1, it can be seen that the difference in means of the two groups was again significant beyond the .01 level of confidence with the water group still spending more time on the bar. Figure 2 shows the relative consistency of the responses of the alcohol group and the sharp decrease in time the water group spent on the bar. These data indicate that alcohol served to reduce the anxiety-producing properties of the situation even after the physiological effects should normally be dissipated.[2]

4. *Relearning Trials*

Table 1 indicates that the difference in the means of the two groups on the relearning trials yielded a t value of .26 with 2.31 required at the .05 level of confidence. In Figure 3 the amount of learning retained is in evidence. These findings indicate that the difference between the two groups in the extinction trials above was not due to a difference in forgetting but was a function of the reduction in anxiety.

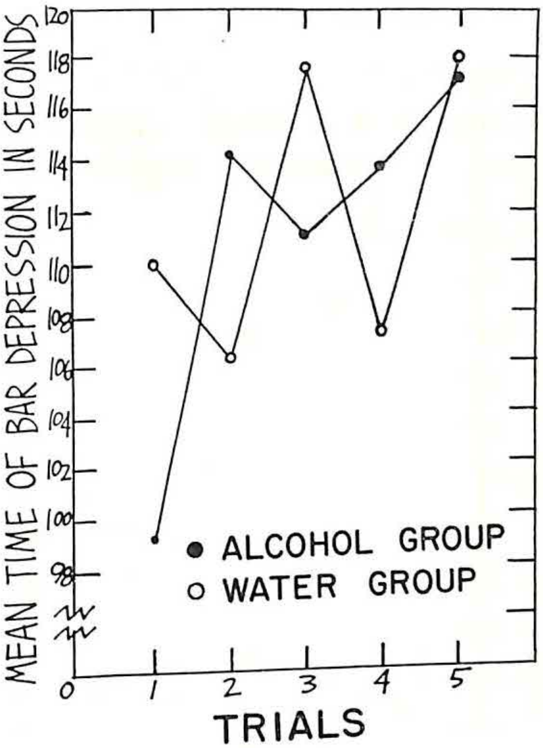

FIGURE 3

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[2] Dr. H. I. Brown, Pathologist, in consultation with the author, expressed the opinion that 72 hours would be adequate for dissipation of the alcohol in the rats.

5. *Behavior Following Injections*

The amount of alcohol injected intraperitoneally was sufficient to effect observable behavior changes in approximately 100 to 120 seconds. During the four-minute period immediately following injection *S* would explore around the table. Muscular coördination seemed to be satisfactory except for an occasional "stagger." Inside the shock box, when not on the bar, they also spent most of their time exploring which included standing on their hind legs. The *S*s injected with water exhibited the same behavior except that no muscular incoördination was in evidence.

E. ADDITIONAL HYPOTHESIS

There is another hypothesis which may also account for the findings in this and related studies. The alcohol may have effected a lowering of activity of certain visceral and motor and/or cortical systems of the *S*s which resulted in a degree of inhibition of the bar pressing response during the test and extinction trials. Thus, during the test and extinction trials, the animals injected with alcohol had a greater opportunity to learn that shock was no longer on the grid or perhaps to learn responses antagonistic to the bar pressing response. Should this hypothesis be correct then it is difficult to explain the lack of a significant difference on the relearning trials.

F. SUMMARY

A group of 18 rats was trained by being given two two-minute shock trials for eight days. *S*s could escape the shock by pressing a bar. The time each *S* pressed the bar was recorded and used as the basis for dividing the *S*s into two equal groups. Just prior to each of the five test trials one group was injected intraperitoneally with 1.5 cc of 10 per cent solution of ethyl alcohol per 100 grams of body weight. The other group received injections of 1.5 cc of distilled water per 100 grams of body weight. Four minutes after injections all *S*s were placed in the shock box for a two-minute period without shock. The bar pressing response of the alcohol group was significantly less (.01 level of confidence) than that of the water group. During the extinction trials, which were given 72 hours following the test trials, both groups were injected with water and given one shockless trial per day for five days. The average time the alcohol group spent on the bar was significantly less (.01 level of confidence) than the average time spent on the bar by the water group. Following the five extinction trials each *S* was given five relearning trials without injections. There was little difference in the average rate for relearning the bar pressing response (*t* value of .26 with 2.31 required at the .05 level of confidence).

The results of the experiment indicated that (*a*) alcohol did reduce anxiety in *S*s, with anxiety defined in terms of a bar pressing response made in a situation previously made fearful by shock; (*b*) the fear-reducing qualities of alcohol last at least 72 hours after injections. Thus, the effects of alcohol in reducing anxiety persisted beyond the period of anticipated physiological involvement. The results indicate that alcohol brings about a relatively permanent reduction of the fear-producing properties of a feared situation in the *S*s.

An additional hypothesis is that the alcohol effected a lowering of activity of certain visceral and motor and/or cortical systems which resulted in a decrease in the bar pressing response. Inasmuch as the alcohol group did not make the bar pressing response as consistently as the water group, they had a greater opportunity to learn that the shock was not on or to learn antagonistic responses in the test and extinction trials. This hypothesis seems unlikely since there was no significant difference between the two groups on the relearning trials.

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ANIMISTIC RESPONSES AS A FUNCTION OF SENTENCE CONTEXTS AND INSTRUCTIONS*

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A. INTRODUCTION

Using different techniques of presentation of test objects and words Piaget (20, 21, 22, 23, 24), Dennis and collaborators (6, 7, 8, 9, 10, 17, 25, 26, 27, 28, 29) and others (1, 3, 4, 5, 13, 18, 19, 32) have found that animistic responses can be obtained from substantial proportions of white (4, 11, 13, 17, 26), Negro (4), Indian (7, 10) and Oriental (14, 15, 31) children, high school and college students (3, 5, 8, 18, 29, 32), and senescent adults (9). Thus, widespread occurrence of animistic thinking seems a well founded descriptive fact which is demonstrable by several response-eliciting procedures.

Once the existence of animistic thinking is established descriptively, however, more precise specification of both remote and immediate determinants of animistic responses becomes of primary importance. Accordingly, this study was designed to ascertain the effects on animistic responses of two experimental conditions: (*a*) the sentence contexts in which words of the animistic test had appeared and (*b*) the type of instructions employed in the test for animism.

The same test words were presented in different contexts—scientific statements, animistic suggestions in the form of poetic metaphors, and a mixture of both types of sentences—on the supposition that associations between the test words and responses like "It's made up of chemicals" for scientific contexts or "It's like a human being" for animistic sentences would be established or activated.[2] In turn, these phrases were expected to mediate responses such as "It can't be living" or "It must be living," respectively and thus decrease or increase animistic responses. Likewise, it was assumed that the "scientist" or "poet" instructions which supplemented regular instructions would evoke different mediating responses or "sets" to thus increase the probability of describing objects referred to by test words as non-living or living.

These assumptions of particular pre-experimentally established patterns of

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[1] This report is based on (30). Parts of the data were presented at the 1955 meeting of the Eastern Psychological Association in Philadelphia.

[2] The "it's" of these responses would refer to the objects specified by the test words.

associations involving mediating responses were central to predictions of differential effects of both context and instruction factors. Sex, religion, and courses in science seemed to be possible correlates or indices of differences in pre-experimental determinants of the nature and strength of such associative patterns. Therefore, in order to obtain information of potential value for interpretation of the effects of the experimental conditions, relationships of each of these factors to animistic responses were also investigated.

B. METHOD AND PROCEDURE

1. *Subjects*

The 255 *S*s participated to meet a requirement of the introductory psychology course at the University of Massachusetts. They were randomly assigned to 12 experimental conditions and run in subgroups of about 10 each.

2. *Stimulus Materials and Apparatus*

The 10 words of the animistic test listed in Table 1 were presented in scientific, animistic, or scientific-animistic sentence contexts. Each word appeared in two scientific contexts [e.g., "Lightning is an electric discharge between two clouds or between a cloud and the earth" (12, p. 115)] to make up a training list of 20 sentences. Twenty additional sentences, two for each word, were added to the training list to make up a 40-sentence recognition list. Each word also appeared in two sentences containing animistic metaphors [e.g., "Earth is here so kind, that just tickle her with a hoe and she laughs with a harvest" (2, p. 417)]. There was also a 40-sentence recognition list. The scientific-animistic list contained one scientific and one

TABLE 1
TEST WORDS AND FREQUENCY OF ANIMISTIC RESPONSES TO EACH FOR ALL *S*S AND FOR *S*S IN INSTRUCTION CONDITIONS

Words	All	Instructions		
		Scientist	Regular	Poet
Sea	124	21*	29	74
Earth	111	21	30	60
Sun	99	16	21	62
Stars	80	12	18	50
Pearl	79	13	19	47
Wind	72	8	8	56
Lightning	68	13	12	43
Clouds	64	6	7	51
Match	53	11	7	35
Gasoline	37	8	7	22

*Since *N*'s for each instruction condition were approximately equal only frequencies are presented.

animistic sentence context for each word with a recognition list of 20 scientific and 20 animistic contexts.

Five different random orders of sentences in each of the three lists were prepared. These orders along with the appropriate recognition list were typed on continuous sheets of white paper which, when used, were wound on a feeding spool attached to an opaque projector. The paper passed from the feeding spool through a wooden mat with a 1½ x 6 in. exposure slot to a rotating drum geared to an electric motor. The paper was pulled so that each sentence was exposed for four seconds. There was a 30-sec. interval between successive random orders. When in the exposure slot, the sentences were projected on a screen in the front of the experimental room.

*S*s were seated in concentric 60° arcs with 30° of each arc on each side of a line perpendicular to the screen. The room was semi-dark for sentence context experiences and fully lighted for the animistic test.

3. *Procedure*

Table 2 presents the factorial design employed. In order to assure full attention as well as to activate and strengthen associations between test and context words, *S*s in scientific, scientific-animistic, and animistic conditions were told to learn the sentences they would see. They were also informed that their learning would be tested. Each of the five different random orders of each type of context was presented once, after which the appropriate recognition list was administered.

TABLE 2
MEANS AND STANDARD DEVIATIONS OF FREQUENCIES OF ANIMISTIC RESPONSES

Sentence contexts	Instructions								
	Scientist			Regular			Poet		
	N	Mean	*SD*	*N*	Mean	*SD*	*N*	Mean	*SD*
Scientific	20	1.60	2.33	20	.85	1.65	20	6.15	2.61
Scientific-Animistic	20	1.55	2.62	25	1.44	2.08	20	6.10	1.81
Animistic	20	1.05	1.83	20	2.70	2.53	20	7.25	2.00
Control	20	2.25	1.67	30	1.40	2.01	20	5.60	2.60

Animistic test sheets were distributed to controls, who had no prior experience with the contexts, as soon as they were seated. *S*s in sentence context conditions received them immediately after the recognition list. The instructions common to regular, poet, and scientist conditions called for *S*s to indicate whether they thought the objects referred to by the words in the left-half column of the test sheets were living or non-living. If the object was considered to be living, a check was to be placed opposite the word in the "yes" column. If not, the "no" column was to be checked. After every word had been checked "yes" or "no," reasons for each answer were to be written in the extreme right-hand column. The additional instructions for *S*s in the scientist or poet conditions called for them to respond "as if you were a scientist, e.g., Newton, Madame Curie, or Darwin" or "as if you were a poet, e.g., Shakespeare, Frost, or Wordsworth." After an opportunity for questions, these *S*s were instructed to go ahead "like a scientist would" or "like a poet would."

Upon completion of the animistic test, a questionnaire was administered to obtain information about *S*s' sex, religious affiliation, and courses in physical and biological science.

C. RESULTS

1. *Contexts and Sets*

At least 40 per cent of the *S*s in every group made one or more animistic responses. Furthermore, all *S*s in two groups (animistic and scientific-animistic sentences in combination with poet instructions) gave at least one animistic response. Means and standard deviations of frequencies of animistic responses for each of the 12 combinations are shown in Table 2. The significant *F* of 122.05 ($p <.01$) for instructions (Table 3) was due to markedly higher frequencies of animistic responses by *S*s told to respond like poets. The mean square for contexts was non-significant as was that for interaction. Thus instructions to respond "like a poet" apparently increased animistic responses both over all and within each of the context and the control conditions.

TABLE 3
ANALYSIS OF VARIANCE OF ANIMISTIC RESPONSES

Source	*df*	Mean square	*F*
Contexts	3	9.71	1.96
Instructions	2	602.94	122.05*
Contexts × Instructions	6	8.61	1.74
Error (w)	243	4.94	

*Significant at <.01.

Table 1 shows that frequencies of animistic responses to particular words ranged from 124 for "sea" to 37 for "gasoline." A coefficient of concordance of .81 ($p <.01$) indicated that rank-orders of frequencies within each of the set conditions were similar.

Reasons for animistic responses were categorized as *contains and/or supports life* (C & S), *movement* (M), *changes and/or grows* (C & G), *pro-*

duces effects (E), *force and/or power* (F & P), *heat and/or light* (H & L), *beauty* (B), and *product of living things* (PL). These categories were derived from Piaget's (20, 21, 22, 23) descriptions of reasons which children gave for animistic responses and the senior author's clinical observations of the animistic thinking of schizophrenics. Table 4 summarizes frequencies of use of each reason with each test word.

TABLE 4
REASONS FOR ANIMISTIC RESPONSES TO EACH WORD*

Words	Reasons								
	C&S	M	C&G	E	F&P	H&L	B	PL	Total
Sea	49	29	28	9	11	0	0	0	126
Earth	76	15	4	1	2	1	0	0	99
Sun	17	22	8	17	15	35	4	0	118
Stars	6	13	7	2	3	21	4	0	56
Pearl	0	0	15	0	0	0	26	19	60
Wind	0	15	17	20	10	0	0	0	62
Lightning	1	25	4	10	17	2	0	0	59
Clouds	2	29	22	5	0	0	1	0	59
Match	0	0	5	8	6	9	0	5	33
Gasoline	0	2	0	6	10	3	0	5	26
Total	151	150	110	78	74	71	35	29	

*Some *S*s gave more than one reason and others no or unclassifiable responses to some words.

"Containing and/or supporting life" and "movement" were cited most frequently. However, the former was largely restricted to earth and sea, while the latter, though given less frequently for any one word, occurred to some degree for seven words. "Beauty" and "product of living things," the least frequent reasons, were applied almost exclusively to pearl.

2. *Sex, Religion, Science*

A non-significant t of 0.93 was obtained for the difference between the mean frequencies for 156 males ($M = 2.83$; $SD = 3.09$) and for 99 females ($M = 3.20$; $SD = 3.13$). Comparison of mean frequencies of animistic responses for Catholic, Jewish, Protestant *S*s and for those with no religious affiliation (Table 5) yielded an F of 1.03 (Table 6) to suggest that animistic responses were not related to religious background.

Extent of background in chemistry, physics, and biological sciences (excluding psychology) both alone and combined was expressed as weighted sums of the number of semesters of high school and college level course work in those fields. One semester of the former was counted as "½" and of the latter as "1." A mean weighted sum of 5.76 for all *S*s for the sciences combined indicated fairly extensive background in science.

Chi-square tests of independence of frequency of animistic responses and amount of course work in biology ($X^2 = 6.35$; $df = 6$), physics ($X^2 = 3.48$; $df = 3$) and of the sciences combined ($X^2 = 9.44$; $df = 6$) were not significant. Although the value of 13.00 ($df = 6$) for chemistry was significant, examination of the contingency table revealed no simple meaningful relationship between weighted scores for chemistry and frequency of animistic responses.

TABLE 5

MEANS AND STANDARD DEVIATIONS OF FREQUENCIES OF ANIMISTIC RESPONSES BY RELIGION

Religion	Mean	*SD*
Catholic	3.48	3.27
Jewish	2.48	2.98
Protestant	2.87	3.05
Other	3.88	3.09

TABLE 6

ANALYSIS OF VARIANCE OF ANIMISTIC RESPONSES BY RELIGION

Source	*df*	Mean square	*F*
Religion	3	10.00	1.03
Error (w)	251	9.72	

D. DISCUSSION

Occurrence of animistic responses can be attributed to response-mediated generalization. In lay descriptions living phenomena do contain and support life, move, change, grow, produce effects by force, etc. The use of these same characteristics as reasons for animistic responses indicates that the same or similar responses were also aroused by test words. As a consequence, to the degree that verbalization of these reasons in turn elicits responses such as "living" and "alive," generalization of "living" and "alive" to test words would be anticipated. And, given the instructions for the animistic test, "living" and "alive" should result in "yes" checks.

Although mean frequencies of animistic responses for *S*s given regular and scientist instructions did not differ, poet instructions resulted in marked increases in animistic responses. Sentence contexts, however, had no differential effects, nor was the interaction of the two factors significant.

The scientist instructions employed may not have reduced or eliminated animistic responses because of failure to increase the frequency of mediating responses embodying general criteria of living or non-living. However, poet instructions may have decreased occurrence of appropriate general criteria and thus increased animistic responding. Or, animistic metaphors may have increased in frequency to bring about more animistic responses.

The contexts employed may not have been appropriate conditions for arousing relevant mediating responses. In the case of the scientific contexts, test words were characterized by various properties of objects to which the words referred rather than in terms of non-fulfillment of general criteria of life. But *S*s' past experiences may have been such that only responses indicating failure to meet general criteria had come to have a mediating function. Likewise, animistic metaphors, either the particular ones employed or in general, might not have aroused the presumed mediating responses. It is also possible that five learning trials and a recognition test were not sufficient to appropriately activate the hypothesized different scientific and animistic mediating responses and/or to assure their transfer to the test situation.

Apparently neither sex nor religion were indices of, or associated with differences in environmental conditions which would have increased use of animistic metaphors and/or of scientific criteria of life. Contrary to Dennis' (8) finding that exposure to a course in science decreased animistic responses, extent of scientific background of *S*s of this study and frequency of animistic responses were apparently unrelated. However, Dennis' *S*s were completing the third semester of an integrated science course in which distinctive attributes of living things had been emphasized. Criteria of life are probably not mentioned in most chemistry and physics courses and the emphasis in biology is more likely to be upon characteristics of living things than upon absence of such characteristics in non-living things. Therefore, amount of background in science may be largely irrelevant to extent of experience in distinguishing between living and non-living things.

E. Summary and Conclusions

This study used 255 undergraduates to investigate frequency of animistic responses as a function of combinations of (*a*) prior experience with the 10 words of an animistic test in scientific, scientific-animistic, and animistic contexts or no such experience, and (*b*) regular instructions and those which called for *Ss* to respond like scientists or poets. There were five learning trials and a recognition test with each context after which the different instructions preceded administration of the animistic test.

Poet instructions produced a significant increase in animistic responses. However, neither sentence contexts nor interaction of contexts and instructions had differential effects. Sex, religion, and extent of scientific background also appeared to be unrelated to occurrence of animistic responses.

For all *S*s there were marked differences in frequencies of animistic responses to the 10 words and in reasons for those responses.

The animistic responses obtained were explained in terms of generalization to test words mediated by reasons such as contains and supports life, moves, and grows. It was suggested, however, that scientist instructions and sentence contexts failed to influence animistic responding because they did not affect the occurrence of appropriate mediating responses. Presumably, poet instructions decreased the use of general scientific criteria and/or increased the number of animistic metaphors.

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DEGREE OF DISTURBANCE IN FIGURE DRAWINGS AS RELATED TO MODE OF APPROACH TO PROBLEM SOLVING*

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A. Problem

The relationship between psychological disturbance and rigidity is investigated. The measure for psychological disturbance is the Steinman scale for rating figure drawings (14) which provides, he reports, a reliable and valid index of psychological disturbance. In 1955 Graham, using the same scale, essentially confirmed Steinman's findings although he had several reservations (5). The scale is weighted, and rates pathological indices such as transparencies, omission of essential details, gross distortions of size and bizarreness, all factors culled by Steinman from his experience and from the literature.[2]

Rigidity is scored following a modification of the Luchins water-jug problems (7). Many studies, including one by the writer[3] in 1952, have illustrated the usefulness of the problems in providing a measure for rigidity (7, 11, 13).

B. Hypothesis

Degree of psychological disturbance reflected in the figure drawings bears significant relation to rigidity manifested in problem solving.

C. Procedure

The protocol of 89 students from an introductory class at Brooklyn College were examined by the author in 1952 to determine the relationship of rigid problem solution to narrowed association process, and was re-evaluated in the present study. The subjects had been group-administered a modification of the Luchins water-jug problems, the human figure drawings and a measure for word association, the latter not used in the current design (11).

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[1] The writer wishes to thank Dr. John R. Whittier, Director of Creedmoor Institute, for his helpful reading of the paper, and Mrs. Joan Van West for her drawing ratings essential to the determination of inter-examiner reliability.

[2] There have been many attempts reported in the literature utilizing several different approaches for rating drawing items. The work of Hinrichs (6), Goodenough (3, 4), Machover (8), and Rawn and Blank (12) are characteristic.

[3] For a review of the pertinent literature, see the 1952 paper (11).

Measures of rigidity were taken directly from the early study. Method II in which problem solving performance was trichotomized into high, low, and middle rigidity scores served as the measure for rigidity. The middle category is not used to help maximize extreme effects. A high group of 19 versus a low group of 18 subjects remains for further analysis (11, pp. 10-11).

The figure-drawing protocols for the 37 subjects were randomized without any identification as to the rigidity score manifested.[4] The writer and another psychologist[5] independently scored a random 10 of these drawings following the Steinman manual. The author alone scored the remainder of the 37 drawings.

D. RESULTS

Although the reliability of the Steinman manual has been established by Steinman himself (14) and by Graham (5), a further check on reliability was run. Reliability coefficient between the investigator and the other psychologist is .95 which is significant well beyond the .001 level. The Steinman manual is reliably administered here and this agrees with the reports in the literature.

TABLE 1
MEANS, STANDARD DEVIATIONS, AND TESTS FOR SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS FOR OVER-ALL EFFECTS

	"High" rigid group	"Low" rigid group
Number in group	19	18
Mean	2.97	2.74
Standard Deviation	.98	1.29
"*t*" test between Means	.61	
"*P*" value	.50 (Insignificant)	

As Table 1 shows, the group having the highest rigidity scores have the highest over-all mean score for psychological disturbance in the drawings.[6] This is in the direction hypothesized, i.e., rigid problem solving performance is associated with psychological disturbance. However, the critical ratio is nowhere near being a significant figure and it must be concluded that the hypothesis is rejected. There is no significant relationship for *over-all* effects between rigidity and disturbance as herein defined.

Examination of the data making up the drawing score revealed several items appeared to differentiate the two groups notwithstanding the lack of over-all effects. Thus of the 59 listings comprising the individual items and groups of them, inspection showed that two clusters seemed significant in discrimination between the high and low rigid groups. Two factors, transparency and omission of essential detail (fingers, hands, arms and feet), seem to be those variables differentiating the two groups. These two factors comprised five items and these were tested for significance. None of the other items were so tested, appearing by inspection to be not significant. Gross bizarreness, head-body disproportion, the drawing of a child (by an adult), dashed line, poor posture, are illustrations of items not differentiating the two groups. It might be argued that selecting only five items out of 59 for testing might allow by chance for statistical significance to take place. Although generally this is a decided risk, when a specific rationale for the selection of items into a cluster is provided, this objection no longer seems relevant. In the present study, there are such clusters for study: omission of essential detail and transparency.

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[4] Each subject had been asked to draw a person. After completing this they were asked to draw a person of the opposite sex. Steinman found that it makes no difference if either or both drawings are used with respect to his scale (14). In the present study, only the first drawings were used.

[5] Mrs. Joan Van West.

[6] In the Steinman manual, pathological indicators are scored and summed. Therefore high scores indicate more disturbance and low scores less.

In the drawing protocols as shown in Table 2, the rigid group compared with the flexible one showed statistically significantly greater tendency to have fingers, hands, arms, and feet omitted—in short a greater propensity to omit essential detail. The rigid group tended in a statistically significant way to evidence more multiple transparency.[7] Strangely, however, the rigid group indicated *less* single transparency in a statistically significant manner. In the discussion section below some attempt at explanation will follow.

TABLE 2
TABLE OF SIGNIFICANT DISCRIMINATORS

	Proportion of group showing the item			
Items in the drawing scale	"High" rigid	"Low" rigid	t	P
Arms, Hands omitted	.684	.277	2.75	.01 *
Arms, Hands & Fingers omitted	.842	.388	3.19	.01-.001*
Feet omitted	.315	.055	2.20	.05-.02 *
Transparencies, one	.157	.500	2.40	.05-.02 *§
Transparencies, multiple	.263	0.	2.63	.05-.02 *

*Statistical significance at the .05 level or beyond.
§Differentiates the two groups in a direction counter to the one hypothesized.

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[7] Examples of what constitutes a transparency for scoring purposes follow: fingers showing through the hand, breast visible through the clothing, legs cutting into the waistline of the body, nose cutting across face contour in profile view, neck cutting through upper trunk line, and the like. Any one indication in the drawing is scored for single transparency and two or more instances of transparency are scored multiple transparency. For a fuller explanation of the scoring system, see Steinman

E. Discussion

The possibility exists that a masking effect of a list of cancelling variables may be the reason for the lack of statistically significant differences for *overall* effects rather than essential non-significance. Thus closer examination of the items reveals significance for a number of them. Notwithstanding the possibility that in any list of *t* scores a certain number will be significant by chance, a piling around certain themes tends to show that a real relationship has been uncovered. Two such statistically significant clusters have been identified: omission of essential detail (exclusion) and transparency (intrusion).

Omission of essential detail and the presence of multiple transparency in figure drawing performance *may* reflect a basic underlying weakness: poorly integrated ego boundaries. When crucial areas are excluded and when one area intrudes into another, it can be said that there exists a deficiency in ego boundary. And the deficiency in ego boundary epitomizes the rigid. The rigid groups exclusion of essentials parallels the author's 1952 findings:

> Perseverative problem solvers evidence a narrower range of reaction types. . . . It would seem that those subjects having this perseverative frame of reference cannot freely shift their approach to objectively changing conditions. Such people would appear to use a limited variety of associational processes (11, p. 38).

Exclusion of essentials characteristic of the rigid may have important dynamic reasons: Flexibility implies a greater ability to allow a shifting attention to all aspects of a stimulus field without overweaning cathexis to any one or several aspects.

It might be argued a priori that rigid persons would have a clearer ego boundary, i.e., excessive ability to categorize separately without overlap (no intrusions) than would flexible persons. The contrary finding emerges: rigid persons have difficulty in keeping separate their categories, intrusion of one into others is the rule. Such persons are unable to logically separate areas; there is too much pressure arising from over-valent need.[8]

The puzzling finding that the rigid group shows, in a statistically significant way, less tendency to *one* transparency offers fascinating opportunity for speculation. To be able to tolerate one transparency—analogous to the momentary setting aside of logic for spontaneity—may reveal a personality well functioning and flexible. The rigid are not able to be spontaneous without becoming overwhelmed. The fear of becoming overwhelmed may be the very thing which feeds the rigidity. See Fenichel for an elaboration (1, p. 151).

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[8] Rapaport (10) offers that rigid persons have poor ego control with consequent flooding of the organism by affect. Such persons confuse boundaries despite their strong need to separate clearly.

To a partial list of rigidity correlates such as difficulty in shifting (Goldstein, 2), sluggishness in variation in response (Werner, 16), a narrowing range of reaction types (Rawn, 11), must be added the two found in this study: *exclusion* and *intrusion*, each as a manifestation of deficiency in ego boundary. In the future, other correlates of rigidity might be studied with the drawings by teasing out additional factors. The attempt simply to count the occurrences in drawings that contain what appears to be significant clusters and test the discriminative power of these clusters in differentiating several groups of various rigidity scores seems to be one promising way of finding relationships to test theory. It seems to be a more promising method than does the use of weighted rating scales for their total score.

F. SUMMARY

The hypothesis that psychological disturbance as revealed in the drawings would bear significant relation to rigidity was found to show a trend in the expected direction. This trend, however, did not approach statistical significance. Masking effects of cancelling variables was offered as a possible explanation for the result. Two clusters characterized the rigid group and differentiated it from the flexible one: *Exclusion* (omission of essential detail) and *intrusion* (transparency). A rationale involving poorer ego boundaries for the rigid was suggested as explanation for these results. The equivocal finding that the flexible group had more *single* transparency was explained as an ability to tolerate single intrusion, such intrusion being an example of spontaneity characteristic for them. The factors of *exclusion* and *intrusion* were added to those already mentioned in the literature as being important correlates of rigidity.

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THE EFFECTS OF SHOCK ON ANXIETY-MOTIVATED BEHAVIOR IN THE RAT*

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A. PROBLEM

If a rat is placed in an alley with a grid floor and subjected to shock, it will learn to escape from the situation by running into a goal box. After a number of trials with shock, it will learn to run to the goal box as soon as it is placed in the alley even though the shock is not turned on. It has been demonstrated that after having been trained in this manner, the rat will run from a safe area of the grid through an electrified area to get to the goal; also that this is a peculiarly persistent response (1, 6).

In 1947 and again in 1948, Mowrer (4, 5) predicted, on the basis of his anxiety theory, that the animal would continue to respond in this manner indefinitely. Gwinn showed, however, that the rats do cease to respond in time, but the animal takes significantly longer to extinguish the response if it runs through shock to get to the goal than if it can achieve the goal without shock. Thus, running through shock has a facilitating rather than an inhibitory effect on the response.

An experiment by Moyer (6) cast some doubt on these results showing that a group of rats shocked during the extinction of this response extinguished significantly faster than a group not shocked during the extinction trials. These results were not clear-cut, however, because one group of rats received more shocks during the training trials than did the other. This was due to the fact that an avoidance procedure was used and the number of shocks the animals received during training was not under the control of the experimenter.

This experiment was designed to test further the hypothesis that an anxiety-motivated response is facilitated by the application of shock during the response.

B. METHOD

1. *Subjects*

In this study, 18 naïve female hooded rats were used. They were 90 to 110 days old at the beginning of experimentation.

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[1] The expense involved in this study was met, in part, by a grant from the Humanistic & Social Science Research Fund of the Carnegie Institute of Technology.

2. *Apparatus*

The apparatus used has been described in detail elsewhere (6). Briefly, it consisted of an alley 10 in. wide, 35 in. long with sides 16 in. high. There was a goal box in the front left-hand corner. The floor of the main alley was composed of two sections of brass rods, each section of which could be electrified separately, or both could be charged at the same time. The weight of the rat on either section of the grid activated a standard electric timer thus indicating how much time the animal spent in each portion of the alley during any one trial. The goal box was provided with a guillotine door. Shock was provided by an electronic shocker with sufficient resistance built into the circuit to minimize individual resistance differences in the *S*s. The intensity of shock used was such that all animals made highly active avoidance response whenever the grid was charged.

3. *Procedure*

In order to provide control over the number of shocks that an animal received during the training trials, an escape procedure was used rather than an avoidance one. The training trials for both groups were the same. Each *S* was given 10 training trials. A training trial consisted of placing the *S* in the right-hand side of the box about three inches from the right and facing that end. The goal box door was closed. After 10 seconds, shock was applied to the entire grid floor and the goal box door was opened. Shock remained on until the *S* achieved the goal box and thus escaped shock. As soon as the *S* entered the goal, the goal box door was closed. Approximately 10 seconds elapsed between trials while the response was being recorded by *E*.

The extinction trials for Group I (non-shock group) were the same as the training trials except that the grid was never charged and the goal box door was always open when the *S* was put into the box but was closed 10 seconds after it entered the goal. It was assumed that the response of running to the goal box was extinguished when the *S* remained outside of it for two minutes.

During the extinction trials for Group II (shock group), the left half of the grid was always charged and the right half never was. Thus, it was necessary for the *S* to run from a safe area through a shock area to get to the goal. The same criterion of extinction was used for this group as was used for Group I, and the goal box door was always open during the extinction trials.

Each animal was given 30 extinction trials immediately after the training trials. If the *S* did not meet the criterion within 30 trials, it was given 40 trials a day on subsequent days until it did meet it. Approximately 10 seconds elapsed between extinction trials.

The amount of time spent on each half of the grid was recorded for each training and extinction trial.

Both groups were tested for spontaneous recovery. As soon as the *S* reached the criterion, it was returned to the home cage until the following day. On the day after reaching criterion, it was again tested in exactly the same manner as before. If it made the appropriate response, it was run until it reached the criterion a second time.

C. Results and Discussion

The shock group required a mean of 105 trials to extinction while the non-shock group required a mean of 41 trials. A Bartlett's test of the data shows that the differences between the variances of the two groups is significant at the .01 level of confidence. The standard deviation of the shock group was 115 trials whereas for the non-shock group it was only 11 trials. This contraindicated a *t* test so the Mann-Whitney test (3) was applied and showed that there was no significant difference between the number of trials the two groups took to meet the criterion of extinction.

Another possible indication of the effect of shock on the anxiety-motivated response is the amount of time the animal remains on the grid before running to the goal box. According to the anxiety hypothesis, a certain level of anxiety is generated by the shocks that the animal received during the training trials. It is this anxiety that motivates it to respond by running to the goal on trials subsequent to the training trials. If a shock for this running response facilitates the response or increases the anxiety to the total situation, it would be expected that the rats in the shock group would be motivated to leave the grid more quickly. The results, however, do not support this expectation. In the shock group, 77 per cent of the animals left the grid more quickly on the second extinction trial than they did on the first. In the non-shock group, 66 per cent of the rats ran faster on the second trial than they did on the first. The difference between these percentages is not significantly above chance.

On the possibility that several trials of shock for the goal running response may be necessary before the facilitation becomes evident, a further analysis was made. A mean latency was computed for the 10 extinction trials subsequent to the first extinction trial. When the mean for these trials is compared with the initial extinction trial, we find that 66 per cent of both groups responded faster than they did on the first extinction trial.

A further possibility must be considered. It may be that the non-shock group is as a whole responding more rapidly on trials subsequent to the first extinction trial and yet the actual magnitude of the latency could be greater than the latency of the shock group. To check this possibility, a mean latency was computed for the second through the eleventh extinction trials for each group. This mean latency was 1.9 seconds for the shock group and 1.8 seconds for the non-shock group. These means are not significantly different from chance and are in the wrong direction to support the facilitation hypothesis.

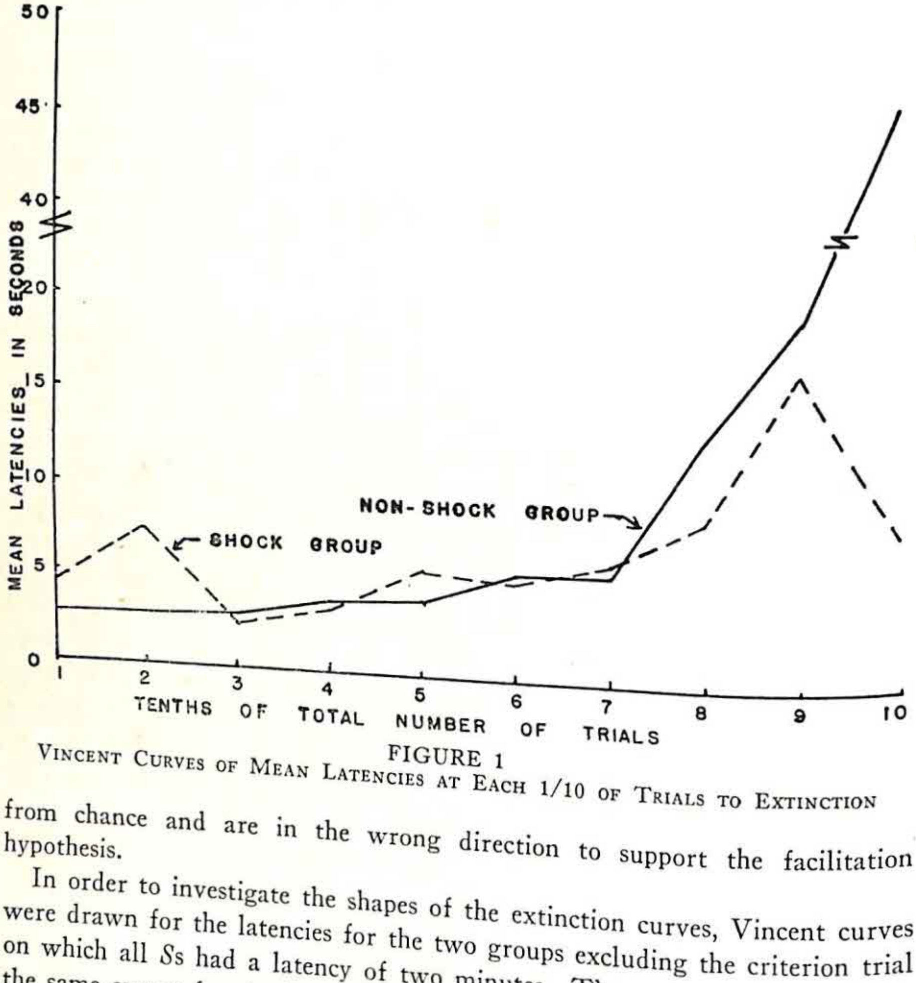

FIGURE 1
VINCENT CURVES OF MEAN LATENCIES AT EACH 1/10 OF TRIALS TO EXTINCTION

In order to investigate the shapes of the extinction curves, Vincent curves were drawn for the latencies for the two groups excluding the criterion trial on which all *S*s had a latency of two minutes. These curves are essentially the same except for the last point which constituted the last trial before the criterion trial. On this trial, the shock group displayed a mean of 8.07 seconds and the non-shock group a mean of 45.77 seconds. For purposes of further analysis, the points of the individual *S*'s Vincent curves were treated as scores and a Bartlett's test of these data indicated that the difference between the variances of the two groups was significantly above chance. However, since the larger variance was less than three times the size of the smaller, and since Lindquist suggests that under these conditions the F distribution is not grossly effected, an analysis of variance was done on the data (2).

TABLE 1
Analysis of Variance of Mean Latencies at Each 1/10 of Trials to Extinction

Source	df	SS	MS	F
Trials	9	10,146.74	1,127.41	1.69
Groups	1	623.47	623.47	.94
Subjects within	16	7,616.03	476.00	3.45
Trials x groups	9	5,994.30	666.03	4.82
Subjects x trials	144	19,885.25	138.09	
	179	44,265.79		

This statistic indicated that there was a significant interaction between the shock and the trials. A series of *t* tests showed that the only points that were significantly different were the last points on the curves of the two groups. This appeared to indicate the possibility of some kind of insight phenomenon, and that the shock group extinguished quite suddenly whereas the non-shock group gradually approached the 2-minute criterion. Since the 9th points on the Vincent curves of the two groups were not significantly different, it appeared that the slowing down of the non-shock group occurred in the last 1/10 of the trials. In order to check this hypothesis, the last 10 trials of each animal were analyzed. It is clear, however, from this analysis that the latencies of the two groups do not differ significantly from chance on these trials. What this apparently means then is that the extinction curves for the two groups are essentially the same except on the trial before the criterion trial. One is, therefore, inclined to wonder if such results could be duplicated, or if this is just one of the five times in 100 that chance rears its ugly head. At least, no other reasonable interpretation of these results seems readily apparent.

Thus, there seems to be no evidence from this study that supports the hypothesis that shock for an anxiety-motivated response facilitates such a response, at least under these conditions.

There is, however, evidence that the shock tends to inhibit the response. As Gwinn (1) pointed out in his study, the animals do, in time, stop running, so inhibitory factors must be involved. In spite of the lack of significant difference between the groups in terms of trials to extinction and latency measures, there is evidence that shock for the response is more inhibitory than no shock. As was indicated in the procedure, each animal was tested for spontaneous recovery on the day following extinction. Of the rats in the non-shock group, 77 per cent showed spontaneous recovery but only 22 per cent of the shock group did. This difference is significant at the .01 level of confidence. Apparently the shock had an inhibitory effect on this response so that it made extinction more permanent.

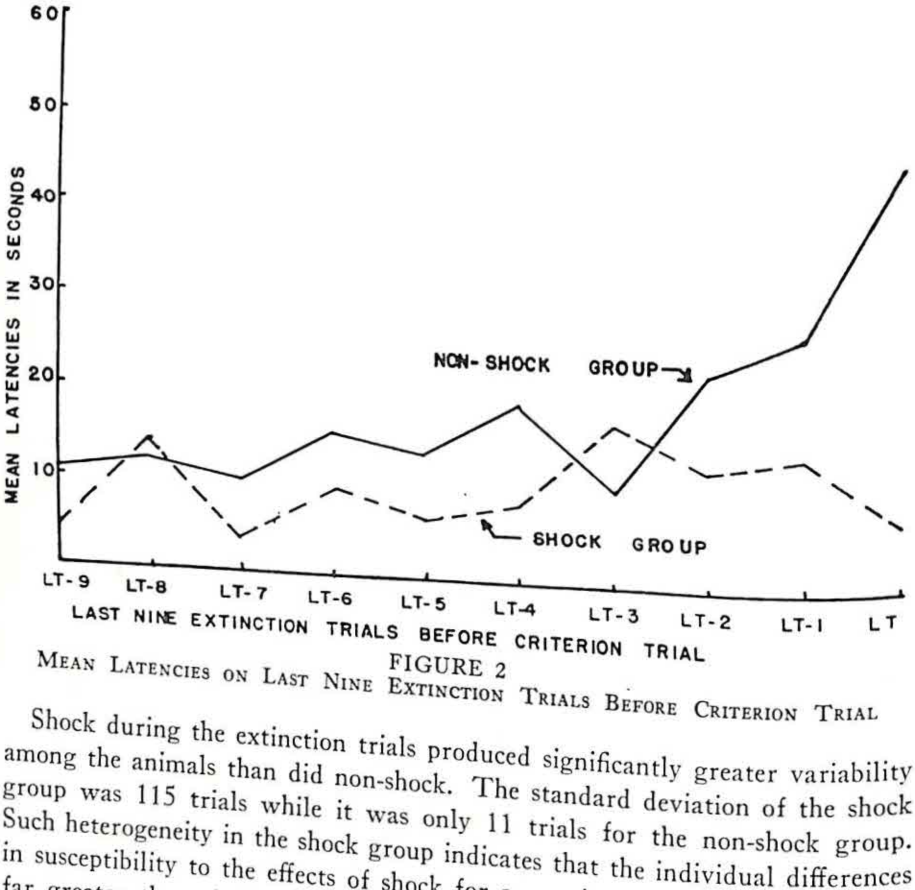

FIGURE 2

Mean Latencies on Last Nine Extinction Trials Before Criterion Trial

Shock during the extinction trials produced significantly greater variability among the animals than did non-shock. The standard deviation of the shock group was 115 trials while it was only 11 trials for the non-shock group. Such heterogeneity in the shock group indicates that the individual differences in susceptibility to the effects of shock for an anxiety motivated response are far greater than they are in the non-shock situation. This may mean that there are wide genetic differences in susceptibility to the influence of shock. It may then be possible, by selective breeding, to develop a strain of rats for whom shock will facilitate an anxiety motivated response, and a second strain in which it is inhibitory. It is possible that this may explain why the results of this experiment differ from those reported by Gwinn (1). He used albino rats while the hooded variety were used in this study. It may be that the albinos are genetically more homogeneous in this characteristic and for them, shock does facilitate an anxiety motivated response.

D. SUMMARY

In this study two groups of rats were trained to escape shock by running to a goal box. During the extinction trials Group I was permitted to achieve the goal without shock. It is necessary for the *S*s in Group II to run through shock to get to the goal. The results indicate that shock during the extinction trials tends to inhibit the goal running response rather than facilitate it. They also show that the variance for the shock group is significantly greater than for the non-shock group.

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THE SOCIOECONOMIC STATUS, INTELLIGENCE, AND PSYCHOMETRIC PATTERN OF NATIVE-BORN WHITE HOMELESS MEN*[1]

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A. Problem

This study is the outgrowth of an attempted follow-up of a group of homeless men studied by the writer in 1944-45 (4). Very few men of the original sampling could be located. The writer, therefore, decided to duplicate one phase of the previous study administering tests and projective techniques that have not heretofore been applied in the study of homeless men. This report is an interpretation of *WAIS* (8) findings.

This research was carried on at the Men's Shelter of the New York City Department of Welfare, in the Summer of 1955. At the time, there was a total of 1,350 homeless men in the active case load of the Shelter (9). According to the New York City Department of Welfare statistics (1), 16.4 per cent were foreign born, 22.3 per cent were Negro. No data as to age, occupation, or education of these groups by race and nativity were available. Studies of the first time applicants do indicate, however, that Negro, foreign born, or Puerto Ricans are considerably younger than the native-born and of a lower educational and occupational status (1).

B. Procedure

When the homeless men appeared in the line (4) in the morning, the intake interviewer selected at random white native-born men and scheduled appointments for them. This selection continued until 50 men were selected to whom a complete *WAIS* (8) could be administered. In order to do

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[1] Based on a paper presented at the Annual Convention of the American Psychological Association, Chicago, Ililnois, Sept. 3, 1956.

[2] The writer wishes to express his appreciation to Mr. Morris Chase, Director, Bureau of Institutional Administration, Department of Welfare, New York City; to Mr. Joseph Mannix, former Director; and to Mr. Avrum Zanft, Case Supervisor of the Men's Shelter, for their coöperation in making this study possible. The writer is also indebted to the following students who participated in the examination of the homeless men: Richard Garber, Rabbi Bernard Gelbart, Seymour Hoffman, Benjamin Lerner, Morton Schwartzstein, and Lawrence Singer.

so it was necessary to schedule appointments for 57 men.[3] Some of the homeless men were examined by the writer. Most of the men, however, were tested by students under the author's immediate supervision. These students had training in the administration and scoring of the tests. The writer checked the scoring of every test.

C. RESULTS

1. *Socioeconomic Status*

Table 1 shows occupations of native-born white homeless men. Note that the homeless men came from all occupational strata of society and that, as a whole, they had a somewhat better occupational background than the entire active homeless caseload.

TABLE 1
OCCUPATIONS OF NATIVE-BORN WHITE HOMELESS MEN

Occupation	Sample *N*	Sample %	Department of Welfare active caseload (1) %
Unskilled	30	60	70
Semi-skilled	14	28	15
Skilled	3	6	13
Clerical	1	2	1
Professional	2	4	1

TABLE 2
EDUCATION OF NATIVE-BORN WHITE HOMELESS MEN

Schooling	Sample *N*	Sample %	Department of Welfare active caseload (1) %
None	0	0	5.1
1-8	28	56	55.5
9-12	14	28	34.3
13 (College)	8	16	5.1

Table 2 shows the education of native-born homeless men. Again we may note that the homeless men have a spectrum of educational backgrounds, from grammar school to college. They also appeared to have more years of schooling than the entire active homeless caseload.

Table 3 shows the age of the native-born white homeless men. The mean *CA* is 48.49 with an *SD* of 8.30. The range is 26-69. We may note that the native-born white homeless men are considerably older than the general run of the homeless. This most likely is due to the fact that the native-born white homeless men may have had some resources either in the form of family or employment, which helped them to stay out of the Bowery until they were considerably older. Possibly the causative factors bringing one to Men's Shelter began to operate at a much later age with them. It is also quite likely that the reasons why the native-born white man is on the Bowery may be quite different from the ones which bring other homeless men.

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[3] Two of these men were intoxicated, two were belligerent and refused to cooperate, two had severe incapacitating organic neurological disabilities, making it impossible for them to perform adequately on the examination, and one had poor vision and no eye-glasses.

TABLE 3
AGE OF NATIVE-BORN WHITE HOMELESS MEN

Age	Sample *N*	Sample %	Department of Welfare active caseload (1) %
Under 21	—	—	.7
21-30	1	2	13.8
31-40	4	8	28.3
41-50	23	46	25.3
51-60	17	34	20.8
61-65	3	6	6.0
66 and over	2	4	4.4

2. *Intelligence*

The full scale *IQ* of the homeless men is 96.79, *SD* 11.33. The range in full scale *IQ*s is 71-124. The mean verbal *IQ* of the homeless men is 101.30 with an *SD* of 12.31. The range in verbal *IQ*s is 71-133. The mean performance *IQ* of the homeless men is 91.62 with an *SD* of 10.90. The range in performance *IQ*s is 74-120. In 43 out of 50 cases, the verbal *IQ* is higher than the performance *IQ*. The difference between the verbal and performance *IQ* is significant at the .01 level of confidence.

It is to be noted that the writer (5) had previously found a full scale Wechsler-Bellevue *IQ* of 100.9 for the native-born white homeless men, as compared to a full scale *WAIS IQ* of 96.79 now reported. While the difference is not statistically significant, it does indicate somewhat of a trend, which may be due either to artifacts of the sample, or to the fact that the *WAIS* (8) is a better standardized and apparently a more valid test of intelligence than the Wechsler-Bellevue. A recent research study indicates that the *WAIS* is geared to a higher level of average performance than the Wechsler-Bellevue (3).

Table 4 shows distribution of verbal, performance, and full scale *IQ*s of the homeless men. Note the decline in performance ability and the relatively good showing in verbal ability.

TABLE 4
DISTRIBUTION OF VERBAL, PERFORMANCE, AND FULL SCALE *WAIS IQ*s OF NATIVE-BORN WHITE HOMELESS MEN

IQ	Classification	Verbal *N*	Verbal %	Performance *N*	Performance %	Full *N*	Full %
130-139	Very superior	2	4	—	—	—	—
120-129	Superior	—	—	1	2	2	4
110-119	Bright normal	11	22	2	4	4	8
90-109	Average	28	56	26	52	29	58
80- 89	Dull normal	6	12	15	30	12	24
70- 79	Borderline	3	6	6	12	3	6
69 and below	Mental defective	—	—	—	—	—	—

3. *Psychometric Pattern*

The *WAIS* has tables for scaled scores which enable one to compare the homeless man's performance on each of the tests with the average for the men of his own age in the normative group. A scaled score of 10 for a test represents the mean score for the particular age in question. Each test has a standard deviation of 3. Since these scores, according to Wechsler (8), have the same meaning statistically at every age level, they may be combined into a scale.

TABLE 5
MEANS, *SD*s, AND SCORE RANGES FOR THE SCALED SCORE EQUIVALENTS OF SUBTESTS OF THE VERBAL AND PERFORMANCE PARTS OF *WAIS* OF NATIVE-BORN WHITE HOMELESS MEN

	Mean	*SD*	Range
Verbal			
Information	10.51	2.29	6-16
Comprehension	10.50	3.26	3-18
Arithmetic	10.31	3.54	5-17
Similarities	9.47	3.19	5-19
Digit Span	10.32	2.57	4-18
Vocabulary	10.86	2.78	5-18
Performance			
Digit Symbol	7.59	2.01	1-13
Picture Completion	9.78	3.08	4-18
Block Design	8.54	2.64	4-14
Picture Arrangement	9.07	3.00	3-15
Object Assembly	7.45	2.01	3-12

Table 5 shows the means, *SD*s and range of scores for the scaled score equivalents of subtests of the verbal and performance parts of the *WAIS* obtained by the native-born homeless men. It may be noted again that the homeless men perform relatively better in verbal than in performance tasks.

Table 6 represents the critical ratios between the means of the scaled scores of *WAIS* of native-born white homeless men and Wechsler's normative group (N of 1,300).

TABLE 6

CRITICAL RATIOS BETWEEN THE MEANS OF THE SCALED SCORES OF THE *WAIS* OF NATIVE-BORN WHITE HOMELESS MEN AND WECHSLER'S NORMATIVE GROUP

	Homeless men Mean	Normative group Mean	Diff.	St. Error of Diff.	*CR*
Verbal					
Information	10.51	10.00	0.51	.303	1.68
Comprehension	10.50	10.00	0.50	.469	1.07
Arithmetic	10.31	10.00	0.31	.508	0.61
Similarities	9.47	10.00	0.53	.448	1.19
Digit Span	10.32	10.00	0.32	.371	0.86
Vocabulary	10.86	10.00	0.86	.400	2.15*
Performance					
Digit Symbol	7.59	10.00	2.41	.294	8.20**
Picture Completion	9.78	10.00	0.22	.439	0.50
Block Design	8.54	10.00	1.46	.381	3.83**
Picture Arrangement	9.07	10.00	0.93	.429	2.17*
Object Assembly	7.45	10.00	2.55	.294	8.68**

*Significant at the 5 per cent level of confidence.
**Significant at the 1 per cent level of confidence.

The writer does not claim that the homeless men represent a nosological category and that, therefore, the psychometric pattern presented may be helpful in individual diagnosis. Quite the contrary, the writer feels that similar patterns may possibly be found with other either emotionally and/or socially maladjusted individuals. The pattern of selected impairment presented may, however, serve as an index and/or clue to the pathology of the homeless men, for when you have a heterogeneous combination of various diagnostic categories, one clinical syndrome might tend to cancel out another. Any differences found might tend to indicate some common way of solving the problems which are unique to the homeless man.

For individual diagnosis on the basis of a psychometric pattern, on the other hand, one must assume that the various items within a subtest measure the same function and an item has identical meaning and value in different age groups. (The writer knows of no evidence which may substantiate this for the *WAIS*). Furthermore, one must consider the intercorrelations of the tests and their reliability, and only then on the basis of Bennett's Nomograph (2) or similar statistical computations can one determine what percentage of difference of scores are due to non-chance factors.

Analysis of the psychometric pattern indicates that the native-born white homeless man's verbal ability (with the exception of vocabulary) does not significantly differ from the norm for the general population, yet he is below the population norms in performance areas. In this connection, we may note Wechsler's (7) statement that clinical groups having organic brain disease, psychoses and neuroses, have a higher rating in verbal than in performance areas. We may observe that the difference in vocabulary scores is significant at the .05 level of confidence. It is widely accepted in clinical circles that, while vocabulary, too, is subject to impairment, yet it is the most stable and least deteriorating aspect of general intelligence (6). This may indicate that the native-born white homeless man has, at one time, had above average general intelligence. The difference in picture arrangement is at the .05 level of confidence. This shows, according to Rapaport (6), that the homeless man fails to anticipate the consequences of his initial acts, and, therefore, has poor planning ability. (The writer noted that quite a few of the arrangements of these men had a psychopathic coloring.) It may be further seen that the difference in digit symbol, block design, and object assembly scores are on the .01 level of confidence. This may indicate organic involvement (7) and inability to perform acts requiring visual motor organization and coördination (6). There is also an indication of lowered learning efficiency and of relative inability to perform adequately at tasks requiring analysis and synthesis.

D. Summary

A study made of native-born white homeless men (*N* of 50) showed that they have a much higher occupational status, better education, and are much older than the general homeless population (Mean *CA* 48.49 with an *SD* of 8.30). While some of the differences may be due to the artifacts of the sample, other factors to be considered are that native-born Americans, as a whole, have had more schooling, better employment, and more resources than foreign born.

A study of the intelligence of native-born homeless men indicated that their *WAIS* verbal *IQ* is 101.30 with an *SD* of 12.31, a performance *IQ* of 91.62 with an *SD* of 10.90, a full scale *IQ* of 96.01 with an *SD* of 20.60. An analysis of their psychometric pattern indicates that they have above average, of the general population, scores in vocabulary (.05 level of confidence) and below average scores in picture arrangement (.05 level of confidence), digit symbol (.01 level of confidence), block design (.01 level of confidence), and object assembly (.01 level of confidence).

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THE CHILD'S UNDERSTANDING OF KINSHIP TERMS: A STUDY IN THE DEVELOPMENT OF RELATIONAL CONCEPTS*

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A. INTRODUCTION

It is well known that young children do not use kinship terms correctly. A correct use of these terms implies that the child is able to handle relational judgments. But this ability does not appear until intellectual development has progressed a considerable way. The study of the development in the understanding of kinship terms can therefore form a useful approach to the problems associated with the transition from non-relational to relational thinking.

Certain intelligence tests have in fact made use of problems involving the use of kinship terms. For example, the Binet-Simon test included the absurd sentence: "I have three brothers; Paul, Ernest and myself." However, for the purpose of investigating the development of concepts it is necessary to use techniques that differ greatly from those of the intelligence tests. For, as Piaget points out (5, p. 153) the intelligence test presents us, as it were, with an intellectual yield, but tells us little or nothing about the processes by which that yield was obtained.

In his own study of the child's use of kinship terms Piaget (4) analysed the replies of children of different ages to the absurd sentence quoted above and then supplemented his analysis by questioning the children. Subsequently, he administered a number of similar tests, all involving the brother relationship. Tests which involved stating how many brothers there were in a certain family (membership) were solved at an earlier age than those which required the child to estimate how many brothers a given brother possessed (relation). Finally, Piaget obtained definitions of the word "brother" (or sister) from children of different ages. He found three levels of definition. At the first stage the term has no relativity at all, a brother is simply a boy. At the second stage the child knows that there cannot be a brother unless there are several in the family, but he assigns the title only to a particular child, say the second born. At the third stage the reciprocal relationship is grasped.

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Very few subsequent investigations have attempted to deal specifically with the development of relational concepts. Hazlitt (3), however, showed that on the practical, as distinct from the verbal level the handling of relationships was achieved much earlier than Piaget had supposed. Since then Piaget has confirmed this repeatedly in his own work and has used this fact as a cornerstone of his systematic theory of intellectual development.

According to this theory the transition from the "egocentric" thinking of the young child to the "operational" thought of older children takes place when the relations between himself and others and between himself and things form systems that allow various relations to operate simultaneously in determining his judgment. Perhaps the most characteristic aspect of the theory is the analysis of intellectual processes in terms of internalised actions or "operations." Now these in fact consist of the handling of relations, be they relations of equivalence, of asymmetry, etc. The transition from ego-centric to operational thought is therefore equivalent to a transition from non-relational to relational thought. On the verbal level this transition is only supposed to be accomplished at about the age of 11, because before this the child is not aware of his own intellectual processes and so is unable to perform those "operations upon operations" which are necessary for the logic of propositions.

One general weakness of Piaget's theory of intellectual development is its preoccupation with what it calls equilibrium states. It tends to prefer minute descriptions of the processes operating at the different levels of intellectual functioning when fully formed to the analysis of the processes that determine the *transition* from one stage to another. It is, in a sense, a static theory. When it deals with the problem of transition, which is, after all, the fundamental problem of development, the theory restricts itself to rather vague statements about the "speeding up" of processes, about sudden acts of restructuring, etc.

This deficiency extends to the sphere of the development of verbal relational concepts. Here, Piaget's own earlier empirical material reveals the probable existence of transitional conceptual forms which lie between the egocentric and operational levels. It is likely that a more detailed investigation of these forms would suggest new hypotheses, more specific than those of Piaget, about the possible mechanisms of transition between the different levels of development. Keeping as close as possible to the empirical material we will not use Piaget's terms with their wide theoretical connotation in referring to these levels of development, but will speak simply of categorical and relational levels. In the case of the former the kinship term is used non-relationally, in an attributive way; for example, a brother is a boy. At this level the relationships of class membership and inclusion appear to be grasped as such without any understanding of the logic of classes and of relations. On the second conceptual level the terms are used in a relational way so that "brother" expresses a relationship between two people. The present investigation was undertaken to study the process of transition between these two levels.

In order to carry out this purpose it was first of all necessary to deal with the preliminary task of establishing some generality for Piaget's work on the definition of kinship terms. This could be done by studying a group of children of rather different cultural background and also extending the investigation to kinship terms other than "brother" and "sister."

B. Method

Having regard to the verbal nature of the concepts to be dealt with, the most suitable method for our purpose appeared to be the interview method, akin to what Piaget calls his "clinical" method. This involves the systematic questioning of the child so as to reveal his concepts in the area under investigation.

In the present study we were concerned neither with age norms nor with individual differences as such but with certain general, qualitative aspects of conceptual development. Thus, the large sample of differential studies had to be replaced by a small sample studied with the emphasis on intellectual processes rather than on intellectual yield.

The use of the interview method has a number of well known disadvantages. The essential requirement is to avoid suggesting replies to the child or artificially forcing his thinking into channels that are strange to it, while yet maintaining comparable conditions from child to child. But when correctly handled this method appears to have properties of flexibility and penetration which are particularly valuable in the investigation of conceptual development. It may be particularly useful in providing material of a type that forms a rich source of hypotheses, although the results it yields must necessarily stand in need of more rigorous verification. It is a desirable modification of the method to present a standard set of questions which does not vary from child to child.

C. Procedure

The number of kinship terms investigated was five: brother, sister, daughter, uncle, and cousin. For each term the child was first asked, "What is a brother" (or sister, etc.). After this very general question he was asked a number of further questions, which differed in accordance with the kinship term involved. The "skeleton" of the interview was provided by a number of questions which were usually asked, and any further questions would merely serve the purpose of throwing more light on the child's response to these central questions. Of necessity the supplementary questions had to depend on the answer the child had initially given to the prescribed question and so would vary from one interview to another (although even here there was only a limited number of questions that could be asked). It was felt that this procedure might produce an optimum combination of flexibility and standardization.

The degree of standardization introduced varied from one kinship term to another. In the case of "brother" and "sister" the number of standard questions was greater than in the case of "daughter," "uncle," and "cousin," because as hardly any material was available for the latter group of terms, it was felt that the probe should be as unconstrained as possible.

The standard questions asked in the case of "brother" were as follows (analogous questions were asked for "sister"):

1. What is a brother.
2. Have you got a brother.
3. Are you a brother—Why or Why not.
4. Is X (some child known to the subject) a brother—*or* Why not (in case of a negative answer).
5. Is every boy a brother—Why or Why not.
6. Do you know a boy that is not a brother.
7. Can a man be a brother—Why or Why not.

For the other group of terms the standard questions were as follows:

1. What is a daughter.
2. Can a lady be a daughter—Why or Why not.
3. What is an uncle.
4. Have you got an uncle.
5. Am I an uncle—Why or Why not.
6. Can a father be an uncle—Why or Why not.
7. What is a cousin.

After each standard question one or more supplementary questions might be asked which would depend on the reply which the child had given to the standard questions. But in many cases further questioning was dispensed with. The sequence of standard questions was adapted to the individual case. To avoid fatigue no child was questioned on all the kinship terms. In the great majority of cases the child was questioned on the term "brother" and on two of the other terms only.

The investigation was conducted with 41 Australian children (20 boys and 21 girls) between the ages of 5 and 8. There were 8 five-year-olds; 11

six-year-olds; 7 seven-year-olds and 13 eight-year-olds. All the children of the same age were in the same grade at school. For each age there was approximately an equal number of boys and girls. It was not thought necessary to include older children in the sample, because our main interest was in the transitional forms which were most likely to be shown by the younger children.

The children all attended the same school in Melbourne, where the investigation was conducted. About 70 per cent were of working class background, about 15 per cent had fathers who were either small employers or self-employed, and the other 15 per cent of the fathers were in white-collar occupations.

The number of children questioned on each kinship term was as follows: brother—36; sister—18; daughter—24; uncle—32; cousin—21. In each case care was taken to take a number of children from each age group and to equalise the sexes.

The investigator established rapport by means of informal conversations in which a number of children took part. The children were then interviewed individually. The questions were introduced as a sort of game, "where you tell me all about a thing, and I write it down, and then we see how much you have said." The investigator took down the child's replies verbatim. The interview proper lasted about 25 minutes with the older children (with occasional extensions) and somewhat less with the younger children.

D. RESULTS

1. *Definitions*

Our results on Australian children confirmed those of Piaget on Swiss children, although we did get the impression that the age norms would differ, the Australian group being more advanced. However, this is a matter for an investigation of a different kind.

We found a clear distinction between two main levels of definition, not only in the case of the term "brother," but of all the other kinship terms as well. At the first level, typical for the younger children, the term would be defined categorically; at the second level, relationally. Here are some examples obtained:

What is a Brother?

Categorical:	"A boy," "A little boy," "A big boy," etc.
Relational:	"You're a bigger boy and he's a little one"; "A boy which is a relation to you"; "A boy that belongs to another girl."

What is a Sister?

Categorical: "A girl"; "A big girl," etc.
Relational: "If your mother's got a boy it means you're sister to the boy."

What is a Daughter?

Categorical: "A girl"; "A little girl," etc.
Relational: "Mother's little girl."

What is an Uncle?

Categorical: "A man"; "A father," etc.
Relational: "Your cousin's father."

What is a Cousin?

Categorical: "A friend"; "A boy."
Relational: "Your uncle's son or daughter."

A third type of response occurred when the child did not even assign the kinship term to any category, like boy, but merely gave the name of a person. We have designated this type of response as pre-categorical. Only eight such responses were obtained among our total of 120 definitions.

All the definitions have been combined as to type and tabulated according to age in Table 1.

TABLE 1
RELATIVE FREQUENCY OF DIFFERENT TYPES OF DEFINITION OF KINSHIP TERMS AT DIFFERENT AGES

Age	Type of definition		
	Pre-categorical	Categorical	Relational
5	5	14	—
6	3	23	5
7	—	13	11
8	—	3	43

The table shows a clear transition from categorical definitions which predominate at ages 5 and 6 to relational definitions which predominate at age 8.

2. *Characteristics of Categorical Stage*

a. The classificatory attitude tends to determine the child's replies to subsequent questions in a consistent manner. He divides individuals by their properties, but these are invariably thought of as simple attributes, not as relations linking the individual with others. Here are some examples of this attributive thinking:

Rod. (5; 7). What is a brother?—*A boy.*—Is Ian a brother?—*Yes*—What makes you say Ian is a brother?—*A boy.*—Is Brian a brother?—*Yes*—How do you know?—*Because he's a boy.*

Pet. (6; 4). What is a brother?—*A boy.*—Are you a brother?—*Yes.*—Do you know Lance?—*Yes.*—Is he a brother?—*Yes.*—How do you know?—*Because he's little.*

b. When properties are purely attributive and not relational there can of course be no question of reciprocity. This is well illustrated in the following example:

Bil. (5; 9). What is a brother?—*A big boy.*—Are you a big boy?—*Yes.*—Are you a brother?—*No, I'm a little brother.*—Are other boys brothers?—*Yes, a couple of other boys.*—Which boys are not brothers?—*Little baby ones.*—Why not?—*Because they're too little.*

Here the child actually differentiates between "brother" and "little brother," as mutually exclusive attributes related to size. Thus it is possible not to be a brother when one is a "little brother"!

c. Occasionally, the children at this stage will misunderstand a question in such a way as to indicate that they do not distinguish between the point of view of membership and the point of view of relation. Take the following cases:

Pam. (6; 9). Is every boy a brother?—*No.*—Why not?—*Because some are girls.*—Is a boy a girl?—*No*—Why not?—*Because there's girls.*

Dia. (6; 4). Is Paula a sister?—*Paula hasn't got a sister, she's only got a little brother.*

In both cases the child has interpreted our question as though we had said "has" instead of "is." Piaget reports a number of similar cases and attaches the greatest importance to this feature. Indeed, he considers the failure to distinguish the point of view of membership from the point of view of relation to be the fundamental characteristic of the pre-relational stage. However, in the present investigation this phenomenon was only rarely observed, and it is doubtful whether it actually has the general importance which Piaget attaches to it.

d. An important characteristic of the categorical stage lies in the failure of logical multiplication. So long as he does not regard the individual as a nodal point of relations but as a member of a class, the child tends to deny that one can be a member of two classes at once. In other words, the failure to handle relations leads to a failure of logical multiplication. This is particularly clearly illustrated by the replies to the question, "Can a father be an uncle?" The younger children generally deny this possibility.

Rod. (5; 7)—*No.*—Why not?—*Because he's a father.*

Lyn. (6)—*No.*—Why not?—*Because they got children.*

Dia. (7; 6)—*No.*—Why not?—*Because we can't have two fathers we* *only have to have one. . . . Instead of being a father he's an uncle.*

Thus one can be *either* a father *or* an uncle, but not both.

3. *The Transition to Relational Thinking*

a. There were some children who gave a categorical definition originally, but who revealed a relational conception of the kinship term upon further questioning. Here are some examples:

Jil. (6)—What is a sister?—*A girl*—Is every girl a sister?—*No.*—Why not?—*Because some haven't got brothers.*

Ida. (6; 11)—What is a brother?—*A boy.*—Are all boys brothers?—*No.*—Why not?—*Because some haven't a sister and some haven't a brother.*—When is a boy a brother? *When he's got a sister or a brother.*

There were a total of eight cases of this type—one at age five, two at age six, four at age seven and one at age eight. It is likely that these are transitional cases where a relational conception has already developed but has not yet displaced the definition characteristic of an earlier stage. This indicates that the child's level of conceptualization cannot be gathered from his initial definition alone.

b. When we come to examine the relational definitions more closely, we find that they clearly fall into two types. In the first type, which comprises the majority of the definitions obtained, the relation is expressed in a very specific and concrete way, but in the second type the relation is given a general and more abstract form. Examples follow for the term "brother":

Type 1: "It's your brother and he lives in the same house." "You're a bigger boy and he's a little one." "A little boy that you live with." "A boy what you sleep with and play with."

Type 2: "A boy which is a relation to you." "It's a boy who could be a brother to a boy or girl."

There were only 14 cases of Type 2 definitions altogether (for all kinship terms). Three of them were given by one seven-year-old child, one by a six-year-old, and the rest by eight-year-olds.

However, just as some children who had initially given a categorical definition turned out, upon questioning, to have a relational concept, so two children, who initially gave a concrete relational definition of Type 1, turned out to be capable of giving an abstract definition upon questioning. This raises the total for Type 2 definitions to 17, 12 of them given by eight-year-old children.

Of the seven children in our total sample who gave one or more abstract relational definitions one was six, two were seven, and four were eight years old. There is a tendency for the proportion of these definitions to increase with age.

c. The nature of the concrete type of relational concept appears very clearly upon further questioning. The most important characteristic is that the relational term is taken to refer only to a specific set of related individuals and lacks generality. Thus, in the case of "brother" it may be only the specific relation between an older and a younger boy in the family that is referred to by this term, or some other specific relationship may be picked out.

Ma. (8; 5). (This boy has two younger sisters.) What is a brother?—*You're a bigger boy and he's a little one.*—Are you a brother?—*No.*—Why not?—*Because I haven't got a bigger brother.*—Is Trevor a brother?—*Yes.*—Why?—*He's got a bigger brother in the fifth grade.*—Do you know any boys that are not brothers?—*Yes.*—Who?—*Philip.*—And why isn't Philip a brother?—*Because he hasn't got a bigger one.*

An analogous case is provided by a child who appears to believe that one must have a sister to be a brother.

Pau. (6; 4). Do you know a boy that is not a brother?—*I know a boy next door.*—And he is not a brother?—*The mother hasn't got any girls at all, only boys.*

As regards *reciprocity* which, as we have seen, was lacking altogether in the children at the categorical stage, the children at the lower level of relational thinking show some progress in that they usually grasp the reciprocity of a relationship between two people other than themselves. But when they are involved themselves the reciprocity seems to break down. This applies also to problems which force the child to put himself in the place of one of the participants in the relationship, for example, the sentence: "I have three brothers, Paul, Ernest, and myself," whose absurdity is not seen at this level. The following is a typical case of a child failing to establish reciprocity as regards herself.

Ros. (6). What is a sister?—*A girl.*—Are you a sister?—*Yes.*—Why?—*Because I'm a girl, if your mother's got a boy it means you're sister to the boy.*—What is a brother?—*A boy.*—Do you know a boy that is not a brother?—*No, every boy that I know has got a sister.*—What is your brother's name?—*Ellis.*—And has he got a sister?—*No,* only me. (Later in the interview the last question was repeated and exactly the same reply was obtained.)

Here, the reciprocity of the brother-sister relationship is expressed quite definitely to begin with, but breaks down as soon as the child's own relationship is involved. Piaget fails to distinguish between these levels of reciprocity, but regards reciprocity as an aspect only of the highest stage, that of operational thought.

4. *The Development of Relational Concepts*

a. The most important characteristics of the higher level of relational thinking, when the relational concepts have taken on a general form, are related (*a*) to the interconnection of relations and (*b*) to the permanence of relations.

When children who have given a general definition of the relation are questioned further, one feature appears in their replies which is largely absent in the replies of the children who give concrete relational definitions. The former group tend to link up the given relationship with other relationships, so that they see it as part of a web of relationships.

In the case of the "brother" relationship these children are almost the only ones who mention the relationship of two children to the same mother as determining their relationship to each other. (The girl Ros. from whom the previous example was taken is one of the two exceptions to this rule.) With children of the highest stage we get replies like the following:

Car. (8; 9). Why are Jackie and Harry brothers?—*Because the same lady went into hospital to get them.*—Who is this lady?—*Mrs. H.* (their mother).

Trev. (8; 5). Are all boys brothers?—*No.*—Why not?—*Because they mightn't be the same relation.*—What do you mean?—*Not the same mother went into hospital to get a baby.*

Joy (7). Are all boys brothers?—*No.*—Why not?—*Because if a lady got a boy and another lady got a boy, they wouldn't be brothers because they got different mothers.*

To such questions children with isolated relational concepts will give replies in terms of some concrete bond, like living in the same house, having the same name, etc., but not involving another kinship relation.

The characteristics of the abstract relational concept may be illustrated by the following example.

Dia. (8; 6). What is a brother?—*Just an ordinary boy, only he belongs in the same family, you call him a brother.* (After some time.) Have you got any cousins?—*Yes.*—Are they of the same family as you?—*Some of them—no, all of them.*—Are your cousins brothers then?—*No.*—But still they belong to the same family?—*Yes, they've got different mothers and fathers but they belong to the same family as my mother and father did.*—Did your mother and father belong to the same family?—*No, my mother belonged to a different family than my father.*

Here, the connection between the abstract relation and the interlinking of relations may be seen clearly. Incidentally, it is also at this stage that the relations *between* classes and the logic of classes come to be handled correctly.

b. The objectivity and permanence of relations is only achieved late. This is revealed by an analysis of the replies to the three similar questions: "Can a man be a brother," "Can a lady be a sister," and "Can a lady be a daughter."

Three quite distinct types of reply were given to these questions. The first two types both answered the questions negatively, i.e., they denied that a man could be a brother, etc. But they differed as to the reasons for this answer. The third type answered the question in the affirmative and gave an adequate reason.

The first type of reply was rare and was only given by children at the categorical level. Here, the child's reply implies that a man cannot be a brother, etc., because there is a conflict between categories; it is the typical belief of this stage that one cannot be two things at once.

Bil. (6; 9). Can a lady be a sister?—*No.*—Why not?—*Because if she was, there'd be no ladies.*

Pet. (6; 4). Can a man be a brother?—*No, it's a man.*

The second type of reply was very common. It was given by children of all stages of development but chiefly by children having isolated relational concepts. The reply was negative, as in the first type, but the reason given referred to some individual attribute, mainly age. The following are all replies to the question "Can a man be a brother."

"No, only when he was a little boy."

"No, because he's too big."

"No, he's grown up."

"No, because he's a bit old for a brother."

Similarly, for a lady being a daughter:

"No, because she isn't young enough to be one."

"No, only when she's little."

"No, because she's grown up."

"No, because she's married."

A number of children at this stage were asked, "When does a man stop being a brother," or the analogous questions for sister and daughter. In almost all cases the answer was, "When they get married." This is an interesting case of the mutual exclusiveness of relations which repeats the exclusiveness of categories, noted earlier, on a new level. The isolation of each relation produces a state of affairs where one has to leave one relationship if one enters another. Only if relations form a connected system can an individual maintain numerous relations at once, while still remaining the same individual because he is now merely one focal point in an objective system.

This is the type of reply we would expect if the concepts of "brother," "daughter," etc., represented isolated relations which depended on the observed characteristics of empirical pairs. In its experience the child has heard terms like "brother," etc., applied chiefly to children, and as long as the concept remains isolated he continues to apply it exclusively in this way. It is only when this relationship becomes dependent on others in the kinship system that it becomes independent of the other characteristics of the individuals whom it links. The relationship, being objective and necessary, is therefore preserved in spite of changes in the individuals whom it links. This is clearly seen in replies of the third type. These affirm that a man can still be a brother, a lady, a daughter, etc., and give a reason which indicates that they have grasped the element of necessity in the situation. Only children who had developed concepts of the abstract relational kind gave replies of this type.

Cher. (8; 4). Can a lady be a daughter?—*Yes.*—How?—*Because she got a mother.*—Is your mother a daughter?—*Yes.*—Why?—*Because she's got a mother.*—Is every woman a daughter?—*Yes, I think they are; they must be; they couldn't be born by no one.*

In the above case the realization of the moment of necessity comes out very strikingly. Here is another example:

Car. (8; 9). What is a daughter?—*It is a lady's or man's little girl.*—Can a lady be a daughter herself?—*Yes.*—How?—*It's just a little girl grown up.*

The identity of the essential relationship in spite of other changes in the individual is here made explicit. Two transitional cases were found where children who were still at the level of isolated relational concepts said that a man could be a brother, but in both cases the reasons given were very concrete and excluded any implication of necessity.

5. *Comparison of Results for Different Kinship Terms*

In general, the levels of development of the different kinship terms investigated showed a remarkable parallelism. We have selected most of our examples from the brother relationship, because for that term we had the largest number of subjects, but similar examples could be given for other terms. As regards the term "sister," the development here was, of course, quite analogous to that of "brother" and needs no further report. The terms daughter, uncle, and cousin remain to be considered.

a. In the case of "daughter," the categorical stage was clearly defined, a daughter being then simply a girl, or a big girl without any relationship being implied. All the five-year-old and all the six-year-old definitions, except one, were at this level. At the next stage a daughter was definitely defined by her relationship to her mother (or occasionally, father), but it was denied that a lady could be a daughter. The argument of the previous section will make it clear that we regard this as a stage of isolated relational concepts. Finally, a few children (3 of eight and one younger) said that a lady could be a daughter and gave an adequate reason as discussed in the previous section. It has already been indicated that this is regarded as representing a higher level of relational thinking.

b. As regards the term cousin, the stages of development were also well marked. There was a categorical stage where a cousin was merely a boy, a friend, etc. Another type of reply also belongs to this stage. This is when the child does not know the meaning of the word but knows vaguely that it has something to do with kinship. He then says that a cousin is "a relation" or "same as an uncle," but in each case further questioning shows that he is merely categorizing the term without being able to use it in a relational way at all. So this type of reply should properly be classified as categorical.

The next step is to use "cousin" as a relational term but very concretely and without linking it to other relations, so that in fact the child still does not know what a cousin is.

Lawr. (7; 6). What is a cousin?—*He likes you.*—Why?—*He's a friend.*—Are all your friends cousins?—*No.*—Why not?—*I've got some friends at school and they're not cousins.*—Are you a cousin?—*Yes.*—How is that?—*I'm a cousin to my cousins.*—How could you get a new cousin?—*If father brought someone there.* Finally, the term is given a general definition and this means, of course, that it must be linked up with other kinship relations. For example, in the following definition given by an 8-year-old: "When your father's or mother's brother gets married and they get a little boy or girl, well, they're your cousins."

c. The term "uncle" shows a number of interesting features of conceptual development. The categorical stage occurs in the usual way. Here, an uncle is simply "a man," "a tall man," etc., and the child denies that one can be both a father and an uncle.

The next stage in the development of the concept occurs when it has become relational, an uncle is always someone's uncle. But the relationship is still isolated from others, and that means, of necessity, that a correct definition of uncle cannot be given. Different children have had different personal experiences with this term and so we find quite a wide range of relationships described by the term "uncle" at this stage. Some children say an uncle is the same as a cousin, some say he is an older brother, some say he is a grandfather, others refer to him as a married man (not the father), who lives in the same house as the child. In each case questioning shows that the term is definitely used relationally, but the definitions are based on isolated instances and lack generality. The relationship is not fitted into a system of relations. Some children do refer to other relations during questioning but in a very different way to the children at the level of connected relations. In the case of the children at the lower level the two relations are merely juxtaposed, they lack logical integration or dependence; they do not form part of an organized system of relations. Thus, when the child reaches the level of isolated relations he no longer maintains, as he did at the categorical level, that one cannot be two things at once, say an uncle and a father. Realizing that uncle and father are relations the child admits that an individual may simultaneously stand in both these relations to different individuals. But these different relations are still logically isolated; they are seen as empirically united in a given individual but are not rationally united into an independent system of interdependent relations.

Bil. (6; 9). What is an uncle?—*Your cousin.*—What is that?—*Boys and girls.*—Are boys and girls uncles?—*No.*—Why not?—*They're too little.*—Is a father an uncle?—*Sometimes.*—When?—*If he's got other cousins, big cousins, then he's an uncle.*—Is teacher an uncle?—*If he had any other cousins he would be.*

In this case "uncle" refers to a relation and so one can be both an uncle and a father. But these two relationships are quite isolated from each other (the child does not know what a cousin is and freely involves himself in contradictions).

Law. (7; 6).—Can a father be an uncle?—*Yes.*—How is that?—*He could be an uncle to someone else.*—Is your father an uncle?—*Yes.*—Whose uncle?—*My cousin's.*

This looks promising but if one refers to this child's notion of "cousin" given earlier in this section it is clear that he has no idea of what a cousin really is. In other words, the child has merely noticed empirically that his father is his cousin's uncle, but he does not know that this is due to his relationship to the cousin's father, and that the latter relation in fact makes his cousin a cousin. The relations thus do not form a coherent system where each item necessarily involves the others; they form an empirical collection. The tendency to a mere juxtaposition of relations receives its typical expression in the words of the following child:

Mar. (7; 9).—How does a man come to be an uncle?—*He was someone's father and then he was another little girl's uncle—*

This brief excerpt summarises the essential lack of connection between the two relations. At the subsequent stage of development "uncle" is given a general definition, such as, "if your mother or father has a brother."

6. *The Comparison of Individuals*

a. In the case of each kinship term investigated the replies of the children can be shown to conform to a series of conceptual levels which have similar general characteristics for each term. The question now arises of whether these levels are purely formal in character in the sense that a child who has reached a certain level will automatically deal with any content on that level. In other words, one may ask whether these conceptual levels are like general mental capacities that could be applied to any content.

Present results, although based on an insufficient number of cases, tend to answer this question negatively. Thus we find that out of a total of 41 children in the sample, 14 gave replies which remained entirely on the categorical or pre-categorical level for all the kinship terms on which they were questioned (generally three); 11 children, on the other hand, used some terms in a relational sense and others in a purely categorical way; 9 children produced isolated relational concepts for all the terms on which they were questioned; 7 children produced connected or abstract relational responses, but only in a single case was there no tendency to relapse into a concrete formulation at some stage in the interview with one or other term.

b. It is now possible to summarise the results in tabular form. In Table 2 the results of the children's interviews have been divided into four categories. Type *A* are interviews which yielded only categorical or pre-categorical concepts for all kinship terms investigated, Type *B* are interviews where some

TABLE 2

LEVELS OF CONCEPTUALISING KINSHIP TERMS RELATED TO AGE GROUPS

Age	Levels				Total
	A	B	C	D	
5	7	1	—	—	8
6	5	5	—	1	11
7	2	2	3	2	9
8	—	3	6	4	13
Total	14	11	9	7	41

terms were handled relationally and others categorically, Type *C* constitutes all those interviews which yield only isolated relational concepts for all terms, and Type *D* are those interviews which yielded connected, or abstract, relational responses.

In order to test for the independence of level of conceptualization and age we may reduce the above table to a four-cell table where the theoretical frequencies in each cell will exceed 5. For this purpose we reduce the number of age groups to two, 5-6-year-olds and 7-8-year-olds and we distinguish two fundamentally distinct levels of conceptualization, *X* and *Y*. Level *X* represents those children whose responses are partly or wholly on the categorical level (Categories *A* and *B* of Table 2) and Level *Y* represents children whose responses are wholly on the relational level (Table 3). The theoretical frequencies are 13.4, 11.6, 8.6, and 7.4. Applying Yates' correction for continuity we get $X^2 = 14.4$ which is highly significant.

TABLE 3

		Levels		
		X	*Y*	Total
Ages	5–6	18	1	19
	7–8	7	15	22
Total		25	16	41

The illustrations given by Edwards (2) make it clear that we may safely accept this result as it stands.

The statistical evidence is therefore not incompatible with the hypothesis that the conceptual levels we have distinguished represent successive stages of development. It should be added that there were no children whose responses were scattered over more than two levels, for example, no children who gave connected relational responses ever gave categorical replies and vice versa.

There appeared to be no consistent sex differences, although five of the seven children in Group *D* were girls. A much larger sample would be necessary to confirm this.

E. Discussion and Conclusions

Broadly speaking, there are two ways in which the transition from nonrelational to relational thinking may be conceived. On the one hand, it is possible to regard relational thinking as arising *de novo* and having no intrinsic connection with the preceding stage. The two stages are then merely juxtaposed. A variant of this solution is that of Piaget who regards the logic of relations as the result of operational activity which consists in the setting up of reciprocal, reversible relations where none previously existed. The only link between the two stages is provided by the rather tenuous hypothesis of the "speeding up" of the "intuitive regulations" of the lower stage.

On the other hand, it is possible to regard relational thinking as *arising out of* the categorizing stage, in the sense that the child proceeds from the setting up of classes composed of single members to the setting up of classes composed of couples united by a common relationship. The term describing such a class would then become a general term for this relationship. A further development would be the articulation of relations between such classes of couples, the setting up of relations between relations, which brings with it the possibility of handling the logic of relations.

The results of the present investigation would appear to suggest that there may in fact be two stages in the development of relational thinking on the verbal level. In particular, some evidence was obtained of the existence of an intermediate stage at which the child understands a relation solely as one between specific pairs of items, but does not integrate this relation in a system of relations. This integration with other relations tends to increase the generality of the relation; it gains in abstractness as it loses its isolation. While the relationship remains isolated it depends for its definition on the observed empirical peculiarities of the specific pairs of individuals which the child happens to know as examples of this relationship. But when the relationship is seen as part of a system of relationships (the kinship system in the present case) the way is clear for a truly objective view of relations. The nature of the relation is now seen to derive from its position in a system of relations; it is therefore independent of the peculiarities of the individuals who happen to stand in that relation to each other. This means that the concept of relation has become truly general and abstract. At the same time the system of relations brings with it the introduction of the category of objective necessity into the thinking of the child, that is to say, the necessity governing the behaviour of a system irrespective of the intent or other irrelevant characteristics of the individuals whose relationship to each other constitutes the system.

The different levels of conceptual development which have been outlined are in fact levels of conceptual form, and the question which must now be discussed is that of the relationship between conceptual forms and conceptual content. This constitutes possibly the most fundamental question of intellectual development.

One of the most frequent criticisms of Piaget's theory of development that has arisen out of other work on concept formation relates to the formalistic character of the theory. Many investigators have shown that the child's level of conceptualization may differ from one type of content to another (1, 3) and from this some have argued that the *only* difference between the thinking of children and the thinking of adults lies in the greater knowledge of the latter. However, such a radical empiricism is not supported by the facts of intellectual development which indicate distinct qualitative differences in the form of thinking, not only as between adult and child, but also between children of different ages [see for example Piaget's work on the child's conception of number (6)]. On the other hand, the facts also indicate a very close relationship between the forms and the content of the thought of children, a relationship which is not adequately dealt with by Piaget's formalistic theory.

As regards the rôle of the formal conceptual levels revealed by the present investigation in intellectual development three important points must be stressed. In the first place, the over-all intellectual functioning of the child does not depend, as is so often assumed, only on the formal level of his concepts. A concept may be formally on the highest level and yet have a content which is a false representation of reality. Thus, we discovered a few children who had a very advanced conception of the relationships which they described as that of "uncle" and "cousin"; the only trouble was that they applied these terms to the wrong relationships. So one child defined an uncle as "mother's father" and another child used "cousin" as a sort of collective term for uncle and aunt, both of which were defined correctly. In both cases the replies of the children were quite consistent with their own definitions and they did not lack the conception of a connected system of kinship relations. But these formal qualities cannot make up for lack of knowledge.

If the level of conceptualization depended only on a general formal capacity and was independent of content, then each child should deal with all the kinship terms on the same level. Thus, a child who thinks of "brother" as an isolated relation should think of uncle and cousin in the same way. But in the present study nearly half of the children in the sample do not consistently handle all the kinship terms on which they were questioned on the same level (see section on comparison of individuals). This seems to indicate that the level of conceptualization depends to a large extent on the child's experience in handling the different types of content.

Finally, it is clear that if the levels of conceptualization outlined here correspond to real stages of development, then the very possibility of transition to a higher stage depends on the opportunities offered by the child's environment. The stage of isolated relations, for example, is neither an *a priori* construction nor a fusion of previously existing elements; it depends on an empirical generalization on the basis of experience. The nature of the generalization made will depend on the nature of the experience that lies at its root.

On this view, intellectual development is not to be explained merely in terms of a succession of formal stages; it requires the interaction of form and content. Thus, when the formal process of categorizing occurs with a new content, when it occurs not with single items but with couples linked by a common bond, then it has already become a new formal process, the process of generalizing relations. And when this latter is subsequently applied to the content given by the relations between relations then it becomes yet a new process again, the process underlying the logic of relations. The general law of development implied in this view is that when an old form of conceptualization is applied to certain new types of content, then it becomes transfomed into a new form of conceptualization. Development therefore depends on the type of intellectual content that becomes available to the child during its growth.

F. SUMMARY

In order to study the development of the understanding of relational terms a group of Australian children between the ages of five and eight were asked to give definitions of a number of kinship terms like brother, sister, daughter, uncle, cousin. They were also asked a series of questions relating to the use of each term.

The findings indicate a clear separation between two conceptual levels which show a correlation with age. At the first level the terms are used attributively and do not imply a relationship, while at the second level they are used relationally. Further, two distinct levels in the relational use of these terms appeared. At the lower level the term expresses a relationship that is both concrete and isolated, while at the higher level the relationship is linked up with others to form a system and its definition derives from its position in this system. The kinship term is now defined in a general way.

The theoretical implications of these findings are discussed with particular reference to the theory of Piaget and the problem of the relationship between form and content in conceptual development.

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LINEAR POSITION PREFERENCE HABITS OF MONKEYS*

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A. INTRODUCTION

Generally, position preferences are controlled for, trained against, or used as an *ad hoc* explanation of negative results. A position preference might be related to laterality, factors of differential reward in a 2-choice situation, or to individual or species response differences. The present investigation was designed to study preferences in a linear dimension away from the animal, and the effects of rewarding positions other than the preferred one.

Davis (2) recently employed a work condition based upon scaled percentages of the greatest distances monkeys would reach for pieces of preferred foods. This work assumed that the reactive inhibition was greater as the reach approached a maximum. This assumption was borne out in the results measured as "balks," since increasing distance caused animals to fail to respond in a positively accelerated manner.

A number of factors could be involved in determining the effect of distance of the lure from the animal on his performance. The most obvious factor is anatomical, arm length and stretch. Another factor might be previous experience, i.e., the probability of obtaining food rewards has been higher when the rewards are nearer, and as distance increases the likelihood of not being able to reach increases. Another factor might be perceptual; the nearer the object, the more compelling it is. Finally, there is the motivational factor. This could be reduced to the "Law of Less Work," but it might also be related to an experiential gradient, i.e., the nearer and more immediately experienced an object, the higher its stimulus value. The first step in investigating the factors involved is to determine the strength of position preference along a distance dimension.

B. METHOD

1. *Subjects*

Forty-three male rhesus monkeys were used as *S*s in the present study. These animals had nearly identical taming and training histories, and have

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been described in a number of recent papers from this laboratory (3, 4, 6). Thirty-three of these *S*s had had varying doses of mixed gamma and neutron irradiations in a period ending four months before the present experiment began. The radiation variable, however, did not seem to interact with the experimental variables of the present study, and will not be discussed. Four subgroups (11, 11, 11, and 12 animals, respectively) were employed in this study and were composed of as nearly equal divisions, as possible, of animals from each of the three radiation groups. However, within these limits assignment was at random.

Each *S* was confined, tested, and trained in his individual restraining-testing cage. These cages measure 18 in. long, 12 in. high, and 12 in. wide, and are constructed of heavy aluminum sheeting perforated with ½-in. holes. Aluminum guillotine-type doors are mounted on both ends. Outside one of the doors, eight ⅜-in. vertical aluminum bars spaced 2 in. apart, center-to-center, are permanently mounted. When the guillotine door covering the bars was raised, the animal could work through the bars and did not have to be transferred to a holding cage for training.

The cage was placed on a table top and the *S* was confronted with three plywood blocks, each measuring ⅞ in. in thickness, and 3 x 3 in. square. The placement of the cage and blocks is shown schematically in Figure 1. Blocks were painted different colors (one red, one lavender, and the third yellow) in order to make them distinguishable. A food well measuring 1 in.

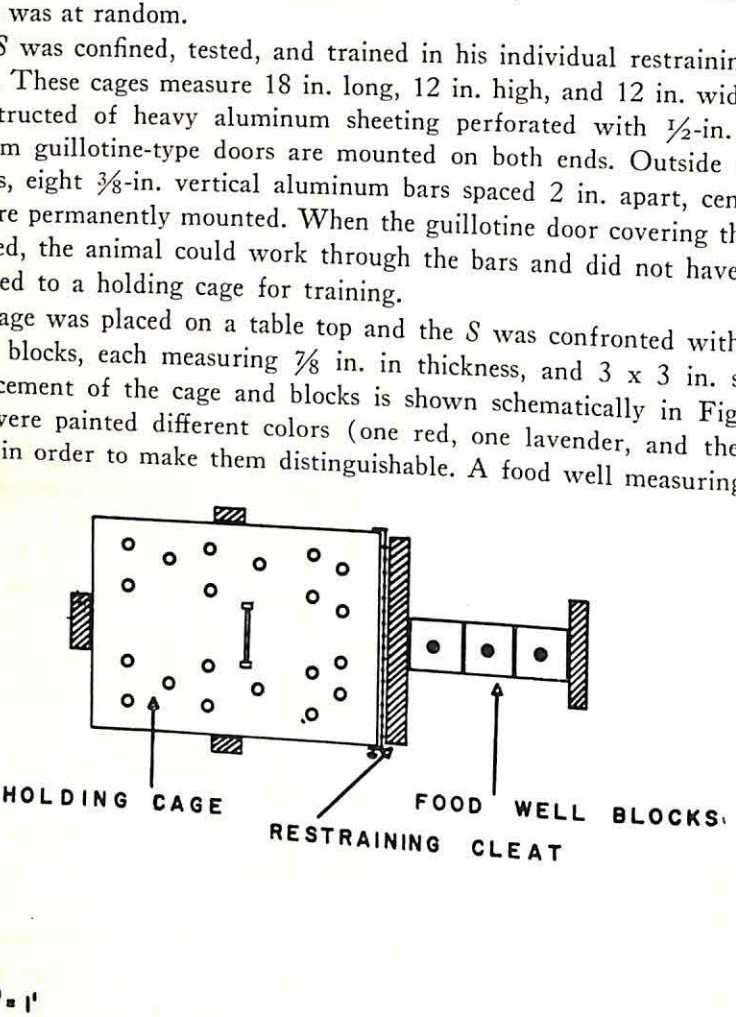

FIGURE 1
ARRANGEMENT OF HOLDING CAGE AND FOOD WELL BLOCKS IN PRESENT EXPERIMENT

in diameter and ½ in. in depth was centered in each block. Blocks could be placed in any one of three positions (near, far, or an intermediate distance, with reference to the *S*), and centers of the food wells lay 3-½ in., 6-½ in., and 9-½ in. from the bars. The furthest food well lay at approximately 75 per cent of the effective reach of most of the *S*s. One piece of a preferred food (raisin, peanut, or corn kernel) was placed in one or more of the food wells, according to the particular experimental condition.

2. *Procedure*

The training was divided into two parts, preliminary training and evaluation of the effects of preliminary training. In the preliminary training period, *S*s were divided into four approximately equal groups made up as nearly as possible from *S*s from the two radiation and one control groups. The 11 animals in Group 1 were each given 75 trials each day for three days, with one piece of food placed in the nearest food well on each trial. The 11 *S*s in Group 2 were each given 75 trials a day with one piece of food placed in the intermediate position food well on each trial. The 11 *S*s in the third group each received 75 trials rewarded by a single piece of food placed in the most distant food well on each trial. The 12 animals in Group 4 were each given three pieces of an alike kind of food, one in each of the three food wells on each of 25 trials given every day. Each *S* in Group 4 was allowed to take all three pieces of food and the order of selection was recorded. To minimize the effects of color preferences, the position of the three blocks was randomized from trial to trial.

The second part of training occurred on the fourth day of the experiment when the effects of the 300 trials of preliminary training given to each animal were tested. On this day all *S*s were treated in the same manner as the *S*s originally assigned to Group 4, i.e., each of the 43 *S*s received one piece of food in each of the three food wells on each of 25 trials and were allowed to select all three foods. The order of selection was recorded.

C. RESULTS

Figure 2 shows the performance of the *S*s in Group 4 during the preliminary training in the present study. The strength of the position preference habit is quite striking since these animals initially selected the food in the nearest food well block on 94 per cent of the trials. Their second choice was almost invariably made to the food well block placed at the intermediate distance, and the third choice was typically made of the food in the furthest food well.

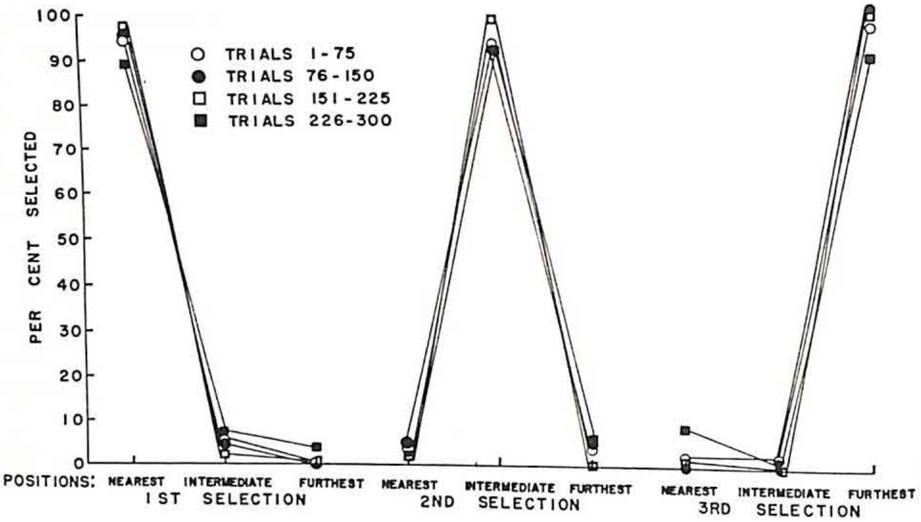

FIGURE 2
PRELIMINARY TRAINING PERFORMANCE OF ANIMALS IN THE ARBITRARILY SELECTED GROUP (GROUP-4) RECEIVING FOOD IN EACH OF THE FOOD WELLS IN THE LINEAR POSITION PREFERENCE TASK

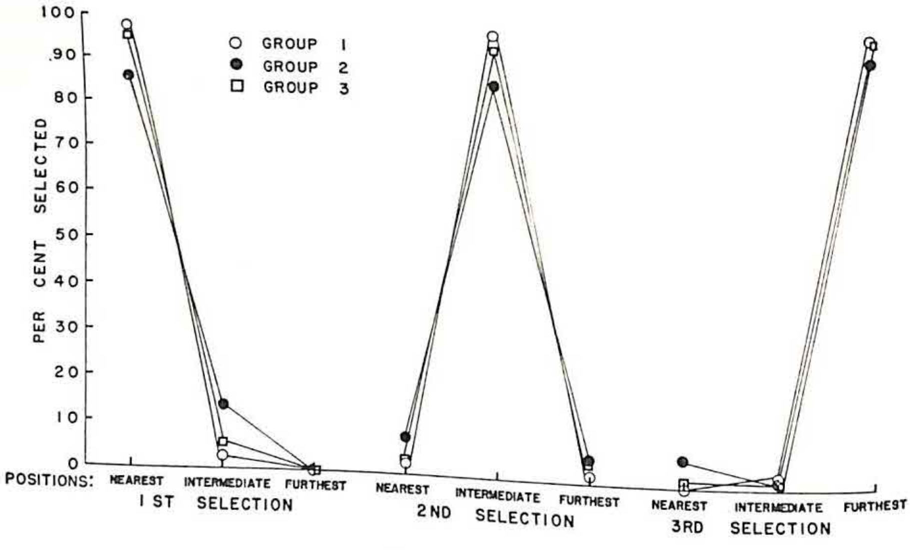

FIGURE 3
PERFORMANCE OF ANIMALS IN THE THREE POSITION TRAINING GROUPS (GROUPS 1, 2, AND 3) ON THE LINEAR POSITION PREFERENCE TASK

Figure 3 illustrates the effects of pretraining animals to select food in the nearest, the furthest, and the intermediate food wells. The performance of the animals in Groups 1, 2, and 3 shown in this figure is very similar to that of Group 4 represented in the previous figure. However, the animals in Group 2 receiving food for 75 trials in the intermediate food well during preliminary training made more initial selections in the intermediate food well and less in the nearest food well than did animals in the other two specially trained groups (Groups 1 and 3). The number of animals from each specially trained group conforming to the temporal-spatial selection pattern of nearest-intermediate-furthest food well on all 25 trials were compared with the number of animals departing from this sequence. One animal in the second training group, seven in the first, and three in the third selected the nearest food well first on *every* trial. The difference between this performance of the animals in the first and second groups is significant at the 5.0 per cent confidence level using the exact formula for Chi-square.

D. Discussion and Summary

The spatial-temporal food selection responses of monkeys in a linear dimension show a marked stereotypy and resistance to change. Since the distances used are under the maximum reach the animals were capable of making, some factor other than "least work" must be involved. The importance of such a factor should not be underestimated, since the uniformity and consistency of linear selection responses far exceeds the uniformity and consistency of correct response made in a discrimination situation by a well adapted and trained laboratory monkey. It is suggested that the nearer an object comes to the *S* the greater experiential value it has. This difference in experiential value is not unlike that found for different food incentives (4), different nonfood lures (1), or found between food and nonfood incentives (3). Thus the lure varies along a common continuum of its experiential potential whether the dimension varied is actual distance the object is from the organism or the possible involvement of the object by the *S*, once the object is selected.

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MILIEU DIFFERENCES IN SOCIAL COMPETENCE*

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A. PURPOSE OF THE STUDY

This study represents an analysis of social maturity scores of kindergarten and fifth grade children. It purports to test the following hypotheses: (*a*) that there are significant differences between urban, small town, and farm children in their performance on the Vineland Scale when the influence of intelligence and chronological age is controlled; (*b*) that these significant differences are not restricted to one age level, but can be found in both early and late childhood.

B. NEED FOR THE STUDY

Social competence in our study is defined following Doll as the "degree to which a person has made progress from dependence to independence from irresponsibility to responsibility, from incompetence to competence" (5). The tool which is used to evaluate this competence is a scale of the standardized interview type which was constructed by E. A. Doll and his co-workers at the Vineland, New Jersey, Training School. The instrument consists of 117 age scaled items which give an indication of a person's development in matters of self-help, locomotion, communication, socialization, occupation, and self-direction. Consideration is given in scoring for lack of opportunity and for performances which are still in the transitional stage. This scale is claimed to be applicable for general use in ordinary urban and rural U.S. situations. However we may recall that the present norms were derived from a standardization group of only 10 subjects of each sex, at each age level, from the first year of life to age 30, in a predominantly urban area on the Atlantic coast of the *USA* (4).

Some investigators who have applied the scale in psychological evaluation, especially of the very bright and the mentally retarded, have felt that progress in social competence seems to be made in different ways and at different speeds depending upon the milieu in which a person is reared. The opinion of the field workers is shared by the author of the scale himself who in his 1953 book on the *Measurement of Social Competence* (5) stresses the necessity

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[1] This study was done under the direction of Dean A. Worcester, University of Nebraska.

of exploring experimentally the variability which arises in rural as contrasted with urban areas, from variations in social milieu and geographical location.

It is thought that a carefully designed study might help to determine whether or not the clinical impressions are correct and what allowance, if any, would have to be made in the use of the scale and consequent interpretation of the results.

C. Review of the Literature

While there have been some studies dealing with the application of the scale to persons from different socio-economic groups yielding a moderately positive relationship between socio-economic status and social competence, no study of rural-urban differences in social competence has been reported in the *USA*. An investigation by Kellmer (7) of a sample of 200 normal and 50 problem children drawn from the working and professional classes of rural and metropolitan Great Britain suggested a slight superiority of the rural group in social competence on the Vineland Scale. No results ot tests of significance between groups are reported, and no differential performance of the experimental groups on the various items of social competence was studied. However, investigations of rural-urban differences using other tools of psychological evaluation suggest a trend toward greater parental control, but also greater self-reliance among rural children as contrasted with city children. Stott (11), then of the Nebraska Agricultural Experimental Station, undertook a questionnaire survey to investigate parental attitudes of farm, city, and town parents in relation to the degree of authoritarian control which should be exercised over children's activities and the extent to which they should be allowed and expected to rely upon their own resources and judgments in daily activities. His findings indicate that the attitude toward parental control appears to be definitely related to the place of residence. Farm parents were inclined to favor the greatest degree of parental control, city parents were inclined to favor a greater amount of freedom for their children.

A study which agrees with Stott's findings on the greater parental control of farm children and gives also evidence as to a higher degree of self-reliance is that of Baldwin (1) on Patterns of Parental Behavior, undertaken with the help of 150 parents of children enrolled in the Fels Research Institute at Antioch, Ohio. Baldwin found that approximately 75 per cent of the farm parents studied were casual in their behavior toward their children. He defines the casual characteristics of the farm home as follows: Children on a farm are as a rule neither warmly accepted nor coldly rejected or resented.

They are instead accepted in a matter-of-fact way and (*a*) given enough attention to take care of their needs, but (*b*) left on their own a great deal of the time, and (*c*) begin to contribute to farm work at a relatively early age.

The findings by Mangus (10) regarding personality adjustment of rural and urban children support Baldwin's claim of a greater self-reliance of farm children. A comparison of 944 rural children on the third and fifth grade level with the standardization group of the California Test of Personality revealed that rural children as a group showed superiority over the standardization group in matters of self-reliance. Mangus concluded that country children have learned to do things more independently, to depend upon themselves, and to direct their own activities to a larger degree than city children.

If these differences be real it may be expected that this should reflect in differential performance of the rural children on the Vineland Social Maturity Scale.

D. DESIGN OF THE STUDY

In an attempt to analyze differences in social competence between farm, small town, and city children, care was taken to select the subjects of this study according to a design which would allow us to (*a*) control the influence which intelligence might have on both social competence as well as urban-rural residence; (*b*) apply tests of significance and correlational techniques to a reliably large number of subjects.

Table 1, in which the distribution of subjects is shown according to the

TABLE 1
DISTRIBUTION OF THE SUBJECTS OF THIS STUDY ACCORDING TO GRADE, RESIDENCE, AND SEX

Residence	Sex F	Sex M	Total
	Kindergarten		
City	30	30	60
Small town	30	30	60
Farm	20	20	40
			160
	Grade 5		
City	30	30	60
Small town	30	30	60
Farm	20	20	40
			160
		Total:	320

main variables, contains a number of terms which are defined here: (*a*) *grade level*: kindergarten children range in age from 4-6 to 5-11, fifth graders from 9-6 to 10-11; (*b*) *residence*: city children were drawn from metropolitan areas of more than 100,000 population, small town children from rural areas, ranging in size of population from 100 to 3,000, farm children from rural areas several miles out of town.

The 320 subjects of this study were drawn from eight counties in eastern Nebraska, two of them predominantly metropolitan: Douglas and Lancaster counties, six of them rural: Butler, Gage, Johnson, Saline, Saunders, and Seward counties. To obtain the names and background information on the children who could qualify for the study, the cumulative records of the county and city superintendents of schools in these eight counties were consulted. Checked were grade standing, birth dates, sex, parental occupation, and residence of all the kindergartners and fifth graders in these eight counties. Those names were eliminated where information was incomplete or where children came from broken homes or suffered from physical handicaps. One hundred sixty kindergartners and 160 fifth graders were randomly selected and their parents contacted.

E. Collection of the Data and Establishment of Inter-Rater Reliability

An appointment was made with the mothers of the children by phone after the purpose of the study had been explained and confidential treatment of the data had been assured. The interview followed the standardized procedure given in Doll's Manual of Directions (4). In one third of the total of three hundred and twenty interviews a second examiner was present. The writer and this second examiner alternated in scoring and interviewing for the purpose of establishing inter-rater reliability. The over-all correlation between the two interviewers on the computed social quotients is .89, for the kindergarten and .88 for the fifth grade group. Percentage of item agreement per item ranged from 98.94 for the most reliable to 74.19 for the least reliable item. This seems to indicate that the data which will be presented are highly reliable as far as the examiner variable is concerned.

F. Control of Intelligence

The design of the study implied that the influence of intelligence on the differential performance of the various subgroups was to be controlled. The two tests which were used in this study to obtain the intelligence quotients of the subjects were the Stanford-Binet, Form *L* (12), and the Lorge-

Thorndike (8) group intelligence tests, Level 1 AN and 3 AV. *IQ*s computed from both tests have the same mean and standard deviation. Tests of significance between the correlations intelligence/social competence derived from the two kinds of tests revealed no significant differences and seem to justify their concomitant use.

G. Findings

The aim of this study, it will be recalled, is to determine whether differences in social competence as measured by the Vineland Scale exist between children who differ in rural-urban background, and whether these differences are consistent from one age level to another. If differences are found and prove to be significant, it is further sought to get (*a*) reliable evidence as to differences in performance of the rural and urban groups on the individual items of the Vineland Scale and (*b*) to determine the degree of interrelationship between residence, intelligence, and social competence. The evidence could be used as a helpful source of information for the extension and possible revision of the norms and items of the Vineland Scale and might increase our present knowledge of differential growth of children reared in different environments.

TABLE 2

MEANS AND SIGMAS OF *SQ*'S AND *IQ*'S FOR THE VARIOUS SUBGROUPS OF THE KINDERGARTEN AND FIFTH GRADE LEVEL ACCORDING TO RESIDENCE

Residence	Mean *SQ*	Sigma *SQ*	Mean *IQ*	Sigma *IQ*
		Kindergarten		
City	125.47	11.2	118.36	12.2
Small town	113.89	7.3	113.68	12.5
Farm	115.50	8.4	110.30	15.9
		Grade 5		
City	113.98	14.6	110.42	22.2
Small town	121.64	10.9	108.19	14.4
Farm	120.16	7.9	105.23	15.3

The findings which will be presented in this section will deal with (*a*) a description of the population, according to means, sigmas and ranges of social and intelligence quotients; (*b*) the results of analysis of covariance testing the significance of differences in *SQ*'s between children from city, small town and farm homes; (*c*) the results of Chi Square tests of significance of the differential performance of the various groups of children on the individual items of the Vineland Social Maturity Scale; (*d*) correlation coefficients showing the degree of interrelationship between intelligence, the milieu variable and social competence.

1. *Description of the Population*

Of the two samples studied the kindergarten group is somewhat superior on mean *SQ*'s and *IQ*'s. Both groups show a relatively wide range in social age, social quotient, and intelligence quotients.

2. *The Results of the Analysis of Covariance*

When the influence of intelligence on social competence has been controlled the following is revealed:

a. On the kindergarten level, no significant differences in social competence between boys and girls; highly significant differences in social competence betwen rural and urban children, favoring the city children (on 1 per cent level).

TABLE 3
ANALYSIS OF COVARIANCE OF *SQ*'S OF KINDERGARTEN BOYS AND GIRLS

Source of variation	Df	Sums of squares	Residuals
			Mean square
Total	115	12,607.65	
Within subgroups	114	12,604.25	110.56
Differences (sex)	1	3.39	3.39
For sex F 1,114	$\frac{3.39}{110.56}$		.031 (insignificant)

TABLE 4
ANALYSIS OF COVARIANCE OF *SQ*'S OF THREE RESIDENCE GROUPS OF KINDERGARTNERS

Source of variation	Df	Sum of squares	Residuals
			Mean square
Total	115	12,607.65	
With subgroups	113	6,259.15	55.39
Difference (residence)	2	6,348.50	3,174.25
For residence F 2,113	$\frac{3.174.25}{55.39}$		57.31 (significant on 1 per cent level)

b. On the fifth grade level, no significant differences in social competence between boys and girls; highly significant differences in social competence between rural and urban children, favoring the rural children (on 1 per cent level).

3. *The Results of the Item Analyses*

In addition to the establishment of group differences in mean social quotients and intelligence quotients, Chi square tests were applied to the various items of the scale to determine the kind and degree of differential performance of the rural and urban children. In some cases it was necessary to combine the small town and the farm group in one rural group in order to avoid small cell entries. Presented here are only those items on which the rural and urban children differ significantly. The performance on individual items which differentiate between rural and urban children reflects the same trends as were shown by an analysis of the group means. The superiority of city children in early childhood reveals itself on items of the self-help, locomotion, and socialization categories, the rural superiority in late childhood is evidenced in self-direction, self-help, and occupation items.

TABLE 5
Analysis of Covariance of *SQ*'s of Fifth Grade Boys and Girls

Source of variation	Df	Residuals Sum of square	Mean square
Total	138	20,261.95	
With subgroups	137	19,992.09	145.92
Differences (sex)	1	269.86	269.86
For sex F	269.86	1.82 (insignificant)	
1,138	145.92		

4. *Correlation between the Main Effects and Social Competence*

Pearson correlation coefficients and point biserial coefficients were computed to show the degree of interrelationship between the milieu variable, intelligence, and social competence. Table 6 indicates that for the two samples included in this study, the kindergarten and the fifth graders, the influence of intelligence is considerably lower than reported in the investigations of Bradway, Deinzer, Doll, Kelly, Wile-Davis (2, 3, 5, 6, 13), an exception being the Louttit-Watson study (9). The relationship is still significantly positive, but seems to point to the fact that correlations of *SQ*/*IQ*'s reported for age ranges of more than 10 years (5, 6, 13) are spuriously high. The study which was restricted to a similarly narrow age range as ours—1-6

TABLE 6
Analysis of Covariance of *SQ*'s of Three Residence Groups of Fifth Graders

Source of variation	Df	Residuals Sum of square	Mean square
Total	138	20,261.95	
With subgroups	136	17,637.56	129.68
Differences (residence)	2	2,642.39	1,312.10
For residence F	1,312.10	(significant on 1 per cent level)	
2,136	129.68		

years in the case of Louttit-Watson (9), yielded also a lower correlation coefficient (.376). It is interesting to note that residence has the highest positive correlation with social competence in early childhood, *more so* than intelligence (which was generally regarded as the variable yielding the highest degree of positive relationship to social competence) and equally so on the fifth grade level.

H. Discussion of the Findings

The object of this study was to test two hypotheses concerning differences in social competence between groups of children on the kindergarten and fifth grade levels. The hypotheses dealt with differences in social competence between rural and urban children and with the consistency of these differences from one age level to another. The design of the study required that age and intelligence would be held constant and that the influence of each variable be tested singly and in interaction with others on a reliably large number of subjects. If differences were found and proved to be significant, they could be used as evidence for the need of an extension of the present norms of the Vineland Scale to include samples of the rural subcultures and the need for adjusting the age placements of certain social competence tasks in line with present-day trends in child development.

The results of the analysis of covariance indicate highly significant differences between rural and urban children on both kindergarten and fifth grade levels. The biserial correlation coefficients between the main effects and social competence on each age level seem to indicate that it is just as important to take into account the influence of urban-rural residence on social competence as it is to consider the influence of intelligence. In addition to the existence of highly significant urban-rural differences in social competence as evaluated by the Vineland Scale there is a trend toward reversal in superiority from one age level to another. Most of the researches on rural-urban differences using other tools for psychological evaluation stressed the fact of greater self-reliance of rural children. We find that this is confirmed by our data on the fifth grade level not so on the kindergarten level. What causes the reversal?

One hypothesis may be that the possibilities for constructive and independent exploration of the environment are more limited for the rural beginner grader than for the urban kindergarten child, especially in the locomotion category. In this connection it may be interesting to note that both small town and farm children have a lower mean social quotient than the city children (both being equally superior to city children on the fifth grade level). This seems to point to the fact that a small town in the Midwest is about as rural in its life style as a farm and seems to offer similar possibilities for growth in social maturity.

Secondly, the autocratic philosophy of child-rearing which Baldwin (1) reports as being dominant among rural parents and which is supported by Stott's (11) findings of greater parental control among rural children might lead to a lesser degree of development of independence in early childhood. This seems to hold especially for social competence tasks in the self-help and socialization categories. Baldwin (1) points out that a rural parent is inclined to take care of his children's needs in the least time consuming fashion and that he wants them "out of the way" soon. It certainly takes less time

TABLE 7
ITEMS OF THE VINELAND SCALE WHICH DIFFERENTIATE SIGNIFICANTLY BETWEEN URBAN AND RURAL CHILDREN

Group favored	Item	Chi square	Level of confidence
	Kindergarten		
City children	goes about neighborhood unattended	20.39	1%
	plays simple table games	7.74	5%
	goes to school unattended	24.98	1%
	uses table knife for spreading	20.80	1%
	uses table knife for cutting	15.04	1%
	combs or brushes hair	30.03	1%
Rural children	prints simple words	36.11	1%
	Grade 5		
Farm children	is left to take care of self or others	11.64	1%
	exercises complete care of dress	6.09	5%
	performs responsible routine chores	43.53	1%
	has own spending money	10.57	1%
Small town children	goes about home town freely	16.67	1%
	goes out unsupervised during day	5.47	5%
	buys own clothing accessories	16.97	1%
		20.80	1%
City children	cares for self at table	47.22	1%

TABLE 8
CORRELATIONS BETWEEN RESIDENCE, INTELLIGENCE, AND SOCIAL COMPETENCE ON THE KINDERGARTEN AND FIFTH GRADE LEVEL

Main effect	r	N	Level of confidence
		Kindergarten	
Residence	.50	160	1%
Intelligence	.27	117	1%
		Grade 5	
Residence	.31	160	1%
Intelligence	.34	140	1%

and effort to help a five-year-old getting ready for school than to watch patiently or to encourage his trial-and-error learning. Similarly it saves time and energy to dish the food right out on the plate rather than to allow him to experiment with the knife and to choose his own food. Thus the tendency of rural parents to take care of their children efficiently, but without loss of time, may lead to their actually babying their children more in early childhood than one would expect from the greater self-reliance shown by most rural children at a later age level.

What then makes rural children more self-reliant on the fifth grade level? It seems that, as Baldwin has indicated, the adults in a rural household include their children early as active contributors in their rural economy. Thus we see 10-year-old rural children engaged in performing responsible routine chores which don't occur among the city children of the same age. They drive the tractor, milk the cows, are in charge of feeding cattle or a "blue ribbon" pig and have in turn an earlier share in the income which arises from the sale of the animals they have been in charge of. Besides the parents, the encouragement given by the 4-H Clubs seems to hasten greatly rural children's growth in social competence in middle and late childhood. Since the parents are often out of the home, in work on the fields or in shopping trips to town, rural fifth graders seem to learn earlier how to take care of themselves and their younger siblings and to exercise complete care of dress—excelling in various items of the self-help, self-direction, and occupation categories of the Vineland Scale.

I. Summary and Conclusions

This study has given evidence as to existing differences in social competence between rural and urban children on the kindergarten and fifth grade levels. It has also shown that there is a trend toward reversal in superiority—with the city children being the more socially competent group on the kindergarten level, the rural children being more self-reliant on the fifth grade level. It is not impossible that studies using samples of children at a later age level will give evidence of a second reversal, which would indicate anew a superiority of city children during the adolescent period, especially in socialization and self-direction types of items on the Vineland Scale.

It is suggested that certain implications of these findings be considered for the application of the scale in various subcultures and the interpretation of its results. In view of existing group differences in social quotients and a substantial loading of some of the items with the influence of environment it may be quite unfair to judge children from one milieu setting, for instance the rural, by standards derived from another setting, e.g., that of the predominantly "urban type" standardization group. A rural beginner grader might by this standard seem retarded in his social competence, but grow into a 10-year-old who surpasses his urban contemporaries in self-reliance. If we consider the fact that a psychological evaluation with the Vineland Scale is usually undertaken for the purposes of long range planning (e.g., early entrance in beginner grade, referral for special classes or institutions for the mentally retarded) the seriousness of such possible misjudgments becomes apparent.

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DEVELOPMENT OF SELF RECOGNITION*

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A. BACKGROUND

The self-image as seen in the mirror is one of the experiences which contribute to the young child's developing awareness of self as distinct from others. Relating what he sees in the mirror back to himself provides one with interesting observations on how the child comes to recognize himself. Theoretical attempts to relate mirror behavior to ego development, such as that of Lacan (4), need empirical observations of developmental change in reactions to the mirror to provide more accurate and detailed models for theoretical constructions. This report traces the developmental sequence of such behavior.

Anecdotal reports on animals placed in a mirror situation agree in describing the behavior of the animal as if he were reacting to another animal. Even among the primates, according to Yerkes (6), there was never any evidence that the animal referred back to himself what he saw in the mirror. Gesell (2), who studied the mirror behavior of infants ranging from 40 to 56 weeks old, noted that the infant appeared to be completely deceived and reacted to his mirror image as though it were another child. Shirley (5) and Zazzo (7) make similar observations. In this respect, then, the naïve animal and the naïve infant behave similarly to the mirror image. Hayes (3), who reared the chimpanzee, "Vicki," in his home from early infancy, observes, however, that "Vicki" made use of mirrors to examine herself and that she recognized the mirror image of others. This behavior, he believes, was certainly present by the age of four years.

Dorothy Dixon (1) studied the effect of experience on the development of mirror behavior in infants. Using the co-twin control method, Twin *C* was given only such mirror experience as was necessary to make behavior comparisons with Twin *T* who was given a year's experience. She found no significant differences in development which could be clearly related to the experience of Twin *T*.

B. PROCEDURE

The present study on development of self-recognition is a continuation of the above study and makes use of the same twins. In addition, similar ob-

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servations have been made on three unrelated singletons. Each infant was observed in his own crib by his own mother, beginning at four months of age and continuing for 12 months, with one exception which was 10 months. Twin *T* had three five-minute periods before the mirror each week, the singletons had one each week, and Twin *C* had four periods on four successive days when 4, 6, 10, and 16 months of age.

Each infant was placed in the middle of his crib in a prone or sitting position, depending on developmental stage, before a mirror which filled one end of the crib. The observer sat at the other end which was covered so as not to cast a mirror image of the observer in the infant's direct view. The sides of the crib were covered with draft sheets to shut out distractions. Behavior sequences (smiling, "talking," observation of image, attempts to contact image, etc.) were recorded at the time of observation.

In order to study how behavior toward the mirror image differs from reactions to others, each infant was occasionally placed before another infant and his reactions noted. The twins were also observed while observing each other and their mirror images. This was done by placing a twin on each side of a one-way vision mirror and, by changing the lighting to make the glass panel transparent or reflecting, it was possible to present one twin with his mirror image while the other twin was observing the twin who was observing his mirror image. By lighting each side brightly, they could also observe each other.

C. DEVELOPMENTAL SEQUENCE OF SELF-DISCOVERY

Since this is not a normative study but a description of a developmental sequence, the particular age at which specific kinds of behavior take place is of less interest than the order of emergence of the particular kinds of behavior. In any event, more confidence can be put in the order than in the age because the order was remarkably constant for all five infants while age was less so.

In each of the five protocols, there appear four distinguishable stages. These stages are described below with protocol samples from one of the singletons and followed by a discussion of the infants' common reactions to mirror recognition.

Stage 1: "Mother"

When he first notices the mirror situation, the infant generally regards his reflection briefly and soberly but shows no sustained interest. When he spies his mother's reflection, however, he shows immediate recognition, more sustained attention to the mirror image and greater activity which includes smiling, "talking," or crying. He follows her moving image in the mirror.

> Seventeen weeks. "None of behavior appeared directed to mirror. . . ."
> Eighteen weeks. "For most of first minute Martha gazed at the mirror rather blindly, observing the image but not responding. . . . . followed image of mother."

Stage 2: "Playmate"

A little later, he becomes more sociable with his mirror image. His interest is gradually sustained for longer periods, he smiles, "talks" and tries to contact the image. His mother's image is still more interesting than his own, but he can look at himself too. The main observation here is that his behavior toward his mirror image is indistinguishable from that when placed before another infant. This behavior was observed from about 4 months to about 6 months of age.

> Twenty-two weeks. "For 15″ she stared and then fussed. Head down 2″. Stared and talked, inched forward, put her hand out, talked, laughed aloud. . . . She talked to her mother's image. . . . She ended with her head almost against the mirror."
> Twenty-three weeks. "Fussed, head up, and talked, kicked. Then stared at image 50″. Head down 15″. Smiled and talked 45″, head down 3″, head up but without fixed attention 8″. Then gazed steadily 60″. . . . Cooed and laughed trying to touch image.

Stage 3: "Who dat who do dat when I do dat?"

Between 6 and 7 months of age, each of the infants begins to react to his mirror image in a new way, as if he is attempting to relate the mirror image to himself. Most characteristic is repetitive activity while observing the mirror image intently, e.g., alternately observing a hand or foot and its mirror image, opening and closing the mouth with deliberation or rising up and down slowly while keeping his eyes fixed on the mirror image. This "reality testing" behavior does not supplant the social play of Stage 2 but appears sporadically during the observational periods and occasionally does not appear during an entire period.

> Thirty weeks. ". . . she reached out to the image, patted it, touched the 'face,' 'eyes' . . . then, still staring at the image, put her hand in her mouth. This action was repeated nine times."

This element of repetition, testing and retesting, is very striking and seems to be the infant's way of trying to master and work through his new-found puzzling discovery. Another new kind of behavior at this time is a prolonged and serious attending to the mirror image. He also begins showing at this time a studied bobbing, bowing, and bouncing while intent on his image. The mirror suffers a great deal of patting, scratching, poking, and even butting.

> Thirty-two weeks. "Then, gazing intently at the image, she bounced, then gazed again as intently. She talked for a moment, then ducked her head, and looked quickly at the image. . . ."
>
> Thirty-five weeks. "She patted the image, watching the hands. For 2′ 50″ she observed her image intently, . . ."

About this same time a difference is noted between reactions to the mirror image and to another infant. This is most clearly noted in efforts at communication and social interaction. The mirror image, like the deaf and dumb tar baby, had not been very responsive and it is not surprising that, when placed before another vocal and independently responsive infant, a greater effort at interaction is made. At seven months Twins *T* and *C* were observed while facing each other in their table chairs. The protocol notes:

> *C* slapped the table and squealed making *T* jump and wince. *T* then slapped his table making *C* jump—both laughed. *T* slapped the table and squealed and *C* laughed. *C* slapped the table and *T* laughed. . . . The game became quite hilarious.

While observing Twin *C* in the one-way vision mirror, Twin *T* was observed to "cough" several times. He had shortly before developed this behavior as a means of attracting attention. He did not "cough" while observing his mirror image.

About this time, too, the infants begin to notice their shadows. This was first observed in Twin *T* while at the seashore. He rocked back and forth while observing his shadow before him and then reached for it but the shadow was too elusive. Then he chased the shadow toward the sea on hands and feet for a distance of about 25 yards and stopped only when his mother prevented him from pursuing his shadow across the Atlantic.

From about 9 months to the end of the study, this reality testing behavior becomes generally a less serious affair and more of a game in which he takes delight. But sporadically, the puzzlement returns. For example: Twin *T* was observed to smile and then, as though reacting to the mirror image, suddenly sobered up, and then smiled again. Occasionally, too, he is bored by it all, but usually he is fascinated.

Along with increasing differentiation of motor development and control, there is a change in the manner of reality testing. In addition to moving an entire arm, he can now move his fingers while observing intently first the finger movements of the image, then of the hand. He attempts less frequently to touch the mirror image. Instead, he occasionally peers behind the mirror and pulls at it or shakes it. It should be noted in this connection that, before he was able to stand and cruise around his crib, it was impossible for the infant to explore behind the mirror.

An apparent attempt at conversation-testing, as though expecting an echo, was observed a few times but soon died out as did pointing at the image while asking some portentous question like, "Dah?"

Stage 4: "Coy"

At the end of the study, a new development was observed in the twins and one of the singletons and, upon inquiry, was confirmed in the other two singletons. The child is confronted with his mirror image and now, instead of basking in reflected vanity, he turns his head. He may cry and try to avoid the image by moving away or he may smile coyly and avert his gaze. A moment later he may kiss the mirror image or he may persist for some time in his refusal. This behavior developed when the children were between 12 and 18 months old. Similar behavior has been reported by Zazzo (7) who observed the development of mirror behavior in his son.

Toward the end of the study, Twins *T* and *C* were individually brought before a full-length mirror and the observer held a piece of candy about three inches from the child's head so that it was out of visual range except in the mirror. Four presentations were made to each twin, one on the left side and one on the right, when hungry and after eating. Both twins turned away from the mirror to the examiner to get the candy. Then both twins were brought before the mirror together and asked, "Where is Jack?" then, "Where is Larry?" This was repeated several times while they were both attentive to the mirror. Their eyes were noted to shift generally toward the proper mirror image.

Relating self and others to their mirrored reflections, however, was not a stable kind of behavior. When about 14 months old, Twin *T* was offered a picture of a dog, in the same way as he had been offered the candy, and his first reaction was to reach toward the mirror. Even at the end of the study, the children fluctuated in their reactions. Generally, they reacted to the mirror image as a reflection, but they occasionally engaged in "testing" and sometimes in "Playmate" behavior.

When compared among themselves, there appear to be no differences in time of development of mirror recognition which can be attributed to the varying amounts of experience. The twins, who provide the best control, both showed the same stages at about the same time. When compared with naïve infants (2, 5), however, the infants in this study show a consistently earlier development of self recognition.

D. Summary

This report traces the developmental sequence leading to mirror recognition and describes the common reactions in infants given controlled mirror experience. At first, the infant reacts soberly to his mirror image but without sustained interest. He then becomes more sociable and behaves toward his image in the same manner as when placed before another infant. Between 6 and 7 months of age, however, he begins to react toward his image as if he were attempting to relate the mirror image to himself. Most characteristic is a studied repetitive activity while intently observing the mirror image. At about one year of age, his behavior begins to suggest true self recognition.

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PROPERTIES OF STIMULI ASSOCIATED WITH STRONG AND WEAK HUNGER DRIVE IN THE RAT*

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A. PROBLEM

Few experiments have dealt with the nature of properties which accrue to stimuli associated with high consummatory drive. A study of Calvin, Bicknell, and Sperling (1) indicated that a previously neutral stimulus situation can acquire motivating properties when it is associated with a relatively strong consummatory drive. The results of this experiment suggested that reinforcement is not necessary for the establishment of a conditioned drive.

Siegel and MacDonnell (2) repeated the above experiment with some changes in procedure. Their results did not indicate that stimuli associated with a strong drive state would acquire greater motivating properties than stimuli associated with a weak drive state.

In both of these studies it was assumed that the same intermediate drive level was obtained when one group of *S*s was shifted from a high drive state and the other group from a low drive state. It seems probable that interactional factors might result under these circumstances which would make such an assumption tenuous.

The conflicting results and presence of the assumed intermediate drive level in both of the above studies suggested that additional experimental work in this area was desirable. As in previous studies, this experiment was designed to ascertain whether or not stimuli associated with strong hunger drive in rats acquire greater secondary motivating properties, as measured by greater food consumption, than stimuli associated with weak hunger drive.

B. EXPERIMENTAL DESIGN

1. *Subjects*

Thirty-two albino rats from the colony maintained by the Department of Psychology at DePauw University were used. The study was carried out in two cycles, each utilizing 16 rats. These *S*s ranged from six to eight months in age and were not tamed prior to the experiment.

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2. *Apparatus*

Three different kinds of cages were used: 16 of cage Type *A*, eight of cage Type *B*, and eight of cage Type *C*. The characteristics of the different cages are shown in Table 1.

TABLE 1
CHARACTERISTICS OF CAGES USED

Cage type	Size inside in inches	Shape	Material	Floor	Brightness
A	7 ht. x 8¾ dia.	Round	Wire mesh and tin	Straw bottom	Unpainted
B	12 x 7¼ x 5½	Rectangle	Wire mesh and wood	Wire mesh	Black
C	12 x 7¼	Rectangle	Wire mesh and wood	Sand bottom	White

The food dishes, which were fastened on the side of each cage, were metal cups two inches in diameter and one inch deep. Water cups were attached in each cage and were kept filled at all times. The food, wet mash, was mixed daily using five parts of water to six parts of pulverized Purina Laboratory Chow. Indirect light remained constant during the entire experiment. It was furnished by a 750-watt ceiling light and a 100-watt table lamp. A stop watch was used for timing the different operations in the experiment. Dietetic scales were used in weighing the *S*s. The food was weighed on Sargent gram scales.

C. PROCEDURE

1. *Preconditioning*

Sixteen *S*s were placed individually into the 16 feeding cages (Type *A*). They were retained there for five days under 23 hours and 20 minutes food deprivation. Two measurements of food ingested by each *S* were taken once a day. One weighing took place 10 minutes after the food was presented and the second weighing took place after an additional feeding period of 20 minutes. Ten minutes were required for the weighing.

2. *Training Trials*

On the first day of training *S*s were divided randomly into two groups of eight *S*s each. One group of eight *S*s was taken from cage Type *A*, 25 minutes after they had been fed, and placed in their weak drive (*WD*) cages

Type *C*, for four hours. They were next placed back in cage Type *A* for 14½ hours; then placed in their strong drive (*SD*) cages Type *B*, for four hours. They were again placed in cage Type *A* for 25 minutes before feeding. Weighing and feeding required 40 minutes. This procedure was followed throughout the training trials. The other eight *S*s received the same treatment except their *SD* cages were Type *C* and their *WD* cages were Type *B*. Thus, one group of *S*s was placed in cage Type *C* while under strong drive and cage Type *B* while under weak drive. The other group of *S*s received the same treatment except the cages were reversed.

3. *Test Trials*

On the first test trial *S*s, then in their *SD* cages, were removed to cage Type *A* where they remained for 25 minutes. Then eight *S*s were replaced into their *SD* cages and the other eight *S*s placed into their *WD* cages. All *S*s were fed immediately while under 23 hours and 20 minutes food deprivation, following the procedure outlined above. After the feeding period, all *S*s were again moved to cage Type *A*. For the other four trials a similar procedure was followed with all *S*s being deprived in cage Type *A* for 23 hours and 20 minutes. Then eight *S*s were fed in their *SD* cages and the other eight *S*s fed in their *WD* cages.

The entire experiment was replicated with a second group of 16 *S*s.

D. RESULTS AND DISCUSSION

1. *Training Trials*

Average daily food consumption for both groups of 16 *S*s tended to increase in a negatively accelerated fashion (see Figure 1).

When *S*s were equated on the basis of the 30-minute feeding period on the last training trial, it so happened that they were also equated for the 10-minute period. The average food intake, on the last training trial, during the 30-minute feeding period for each group was 39.2 grams and the average food intake during the 10-minute feeding period for each group was 17.0 grams.

2. *Test Trials*

As shown in Table 2, the difference in food intake between the two groups was not significant on the first test trial. An unmatched *t* of .54 was obtained for the 30-minute feeding period and .24 for the 10-minute period with 2.05 required at the five per cent level of confidence. It will also be noted from Figure 1, that the slight difference between the two groups, which

TABLE 2
MEAN FOOD CONSUMPTION
FOR 10- AND 30-MINUTE FEEDING PERIODS FOR BOTH GROUPS:
$N = 16$ IN EACH GROUP

	M		SEd		t		P	
	10	30	10	30	10	30	10	30
High drive group	16.1	37.7	.83	2.21	.24	.54	——	
Low drive group	15.9	36.5						

was obtained on the first test trial, was almost exactly the same difference that had been in evidence from the beginning of the training trials.

These findings do not indicate that stimuli associated with strong hunger drive in rats acquire greater secondary motivating properties, as indicated by the amount of food ingested, than do stimuli associated with weak hunger drive. Thus, these results do not support the findings of Calvin, Bicknell, and Sperling (1). They are more in line with the data reported by Siegel and MacDonnell (2).

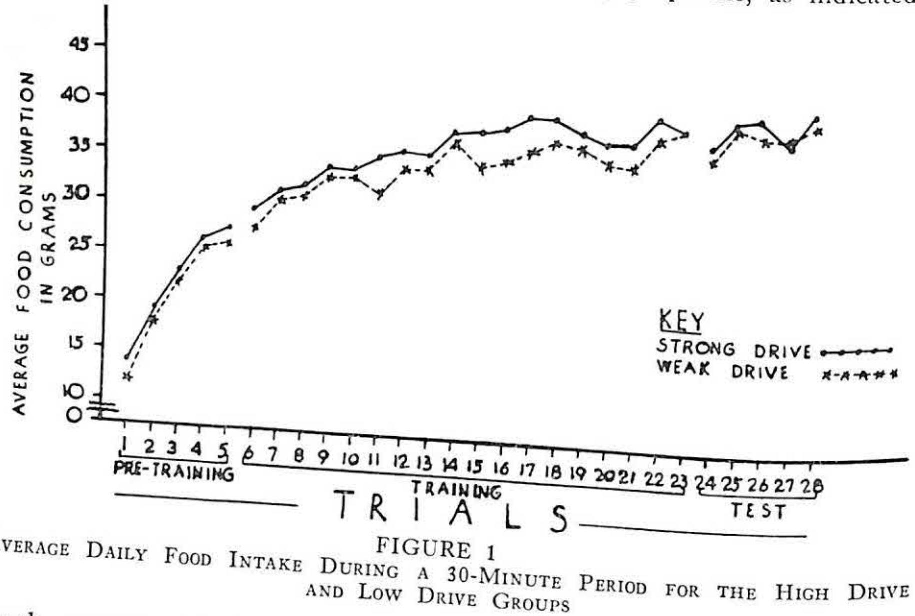

FIGURE 1
AVERAGE DAILY FOOD INTAKE DURING A 30-MINUTE PERIOD FOR THE HIGH DRIVE AND LOW DRIVE GROUPS

E. SUMMARY

This experiment was designed to test the hypothesis that stimuli associated with strong hunger drive will acquire greater motivating properties than stimuli associated with weak hunger drive. A group of 16 rats, under

23 hours and 20 minutes food deprivation, were given five days of preconditioning during which time measurements of food consumption were made. In the 18 days of training trials which followed, *S*s were put into one type cage under strong drive (*SD*) and a different type cage during weak drive (*WD*). Prior to the test trials, *S*s were equated into two groups (designated as the *SD* and *WD* groups) on the basis of average food intake. The *WD* group was tested by being fed in the cages where previously they had been placed for four hours *after* feeding, and *S*s in the *SD* group were fed in the cages where they had been placed for four hours *prior* to feeding. This procedure was replicated with 16 more *S*s making a total of 16 in the *SD* group and 16 in the *WD* group. The difference between the mean food intake of the two groups on the first test trial was not significant. A *t* of .54 was obtained with 2.04 required at the five per cent level of confidence.

The results did not support the hypothesis that stimuli associated with strong drive acquire greater secondary motivating properties than stimuli associated with weak drive.

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ELEMENTS OF CONDITIONING IN NORMAL AND PATHOLOGICAL HUMAN BEHAVIOR*

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A. PROBLEM

Since the time of Pavlov and Watson, the pendulum of psychological theory has swung violently from one side to the other. Many theorists have been enamored of the principle of "all or none." They have felt obliged to maintain either that conditioning explains all human behavior or that conditioning explains nothing, or at most, very little. This division in the camps of psychological theory has been maintained for so long that it would seem pedantic to quote references from Behaviorists (or descendants of the same), Gestaltists, or psychoanalysts.

In the spirit of scientific speculation, we propose to consider the possibility that certain elements found in the so-called classical conditioning situation may be present to a greater or lesser degree in many different forms of human learning. Let it be clear that it is to these elements that we refer as we proceed and as we use the term "conditioning," thus forestalling the objection "But this is not classical conditioning." We are merely interested in certain common denominators found in Pavlovian and other reflexology and in many different forms of human learning. These common denominators are: (*a*) a stimulus which elicits a specific response or several responses (voluntary or involuntary), (*b*) a second or third stimulus contiguously related to the first. This stimulus formerly did not elicit the response in question but now does so in virtue of this contiguous relationship.

We shall endeavor to examine the part played by these common denominators in the following areas of learning and behavior: (*a*) the acquisition of tastes, (*b*) perception, (*c*) language, (*d*) fears and phobias, (*e*) the lie detector situation, (*f*) the psychopathic state, (*g*) hypnosis and suggestion, (*h*) hysteria, (*i*) compulsions and superstitions, (*j*) psychotherapy, (*k*) higher learning.

Much of the discussion will involve summaries of previous reports on these subjects, and evidence upon which our speculations rest will be drawn not

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only from the data of specific laboratory experiments but also from real life situations where only "fate" may be termed the Experimenter.

B. AREAS EXAMINED

1. *The Acquisition of Tastes*

Here we press the simple question: "How do we learn to like things which, when originally encountered, were unattractive or even revolting?" In a previous article (20) we suggested the principle that the organism resists any sudden, violent change. Just as the individual rebels at a sudden change from extreme cold to extreme heat, so too, will the organism be revolted by a change in diet to food which is very different in taste or consistency from the accustomed diet, no matter how nourishing the food may be. Let us take the example of the young child who tastes his first olive or oyster. So different are these in flavor from anything he has ever eaten that they may be utterly obnoxious to him. It is commonplace for mothers to notice that infants reject new flavors or consistencies. As pressures of various types oblige the child to eat the olive or oyster, it becomes less and less abhorrent. In other words, we say that he adapts to this minor trauma. The fact that he may reach the point where he scarcely minds the food is not half as interesting as the frequently observed phenomenon that he may learn to love olives or oysters.

The first taste of an alcoholic beverage, be it beer, wine, or whiskey, is probably objectionable to most people; yet many become heavy drinkers. Traditionally, a boy's first pipe will make him ill, yet he may become a heavy smoker. As Lindesmith (10) points out, the stab of a hypodermic needle produces a painful injury to the flesh, yet many addicts not only adapt to the pain but come to enjoy the sensation of the needle stab.

As is well known, the strength of the unconditioned stimulus is all important. Addicts come to enjoy the jab of the needle only because of its association with the intense pleasurable effect of the drug. Tooth pulling is associated with the relief of toothache but we have never heard of a person who came to enjoy his teeth being pulled. This is so firstly because tooth pulling is much more painful than the jab of the needle, and secondly, because the relief of an aching tooth may not be comparable in intensity with the more positive effects of drugs. Many textbooks describe the effect of a *dominant* stimulus in conditioning. The classical example is that a slight shock paired with food will result in the hungry dog salivating when given a weak shock. But, pair now a severe shock with a little food given to a not-too-hungry dog and the animal will jump and withdraw; he will not take the food. In experiments described in Topic 10 which follows, Masserman's cats came to associate a food bin with the satisfaction of hunger and also with the reception of a blast of air. Does the cat come to like the air blast on account of its association with food? NO, it does not, except as in Masserman's experiments on masochistic cats, when the association is pleasurably balanced. Indeed, it too refuses the food. Thus, if the dominant stimulus is extremely painful, need reduction will not ensue and this dominant stimulus will not become liked or tolerated, and neurosis may be produced.

In each of the above four cases (the olive, alcohol, pipe, and hypodermic) an unusual, unpleasant, or even painful stimulus became associated with a stimulus which satisfied a need, such as hunger or social approval, the pleasant relaxing effect of alcohol, the sedative effect of smoking, and the ecstatic escape offered by drugs. The fourth case involves pain and injury although the first three cases do not.

In an unpublished longitudinal study by Welch, of a group of children from 14 to 27 months of age, it appeared that young children learned to like those tastes and odors with which they first came in contact. For instance, one 14-month-old child showed a marked preference for the odor of asafetida to which he had been exposed early, although he was completely indifferent to four different brands of perfume.

Kanner (8), in his discussion of the Pica appetite, describes case histories of children who ate bugs, plaster, matchheads, garbage, and feces, in preference to normal food. During the early formative years even such filth in association with hunger or specific bodily needs can become attractive to the human organism.

The stench of cod liver oil can be very pleasing to the two- or three-year-old child. However, as the child grows older, he, like most of us, will come to dislike the odor. Here is an example of learning to like the smell and taste of a certain food in virtue of its relationship with the satisfaction of a need and then learning to dislike the same stimulus in conditioning or quasi-conditioning situation which does not involve reinforcement, plus the fact that, in the meantime, the individual has learned to like tastes and odors very different from such an earlier stimulus.

The individual can learn to dislike a taste or odor in virtue of its association with a distressful situation or stimulus even though he had formerly learned to like it. The alcoholic who has been given conditioning therapy is now sickened with even the odor as well as the taste of his erstwhile favorite brand of whiskey. The whiskey given to him during therapy contained an emetic and now the odor and taste have become associated with pain and discomfort; hence they are repulsive. If this new unpleasant association is not reinforced, he will relearn to like such an odor and flavor in virtue of the satisfaction he has previously derived from alcohol.

The problem is highly complex. The individual who learns to like a certain stimulus does so in most instances in one or possibly several situations only. There is no universal consistency in preference for a stimulus divorced from a setting or situation. For example, a woman learns to like the odor of a strong smelling cheese, but only in the cheese situation. She has also learned to like the odor of a certain type of French perfume, but only in fairly well defined situations. Suppose we present her with a cheese which has the odor of her favorite perfume, and *eau de cologne* which has the odor of her favorite cheese. She will be revolted by both. Had her training been reversed, it is quite comprehensible that she would like to eat cheese which smelled like Chanel Number 5 and use perfume Limburger Number 1. In some cultures rancid fish oil is an attractive perfume for all who have been trained to like it. Anthropologists supply us with many similar examples.

Tastes or odors do not have to be associated with a basic physiological need. We have in mind the case of a famous journalist who, upon smelling the stifling odor of printer's ink in the pressroom of his newspaper building, inhaled deeply and exclaimed: "I love the delicious smell of printer's ink." This odor was closely associated over the years with the love of his life, journalism. Many would refer to the symbolic[1] significance of the printer's ink in this man's life; the odor of the ink was a symbol of his beloved life work. The basic relationships are the same as those we examined in connection with learning to like oysters and olives. These involve a stimulus which is associated with the satisfaction of a basic physiological need. The ink is a stimulus associated with rather complex acquired needs. The odor of the oyster does not satisfy hunger any more than the smell of printer's ink satisfies one's desire to be a journalist. In either case, however, the individual learns to like a stimulus to which he was formerly indifferent or which he disliked.

There is one more type of complexity to be considered in the development of preferences in addition to that of the single stimulus in the whole situation which we have already discussed with reference to the cheese and perfume situations. This is the complexity of the stimulus pattern or compound.

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[1] Symbolism is here used in the sense of representing an abstract ideal or a concrete object, just as the olive branch represents peace, or the stars and stripes represent the *USA*.

For example, an individual purchases one brand of cigarettes only. He will walk from store to store to purchase this brand and stoutly refuse all others. Nevertheless we know, and he will probably admit, that he could very easily be fooled. Present him with another brand in the package of his choice and it is very unlikely that he will detect the difference. This has been amply demonstrated in the "blindfold tests" by the cigarette manufacturers. Similarly, it has been claimed that some smokers who became blind lose their taste for tobacco because they can no longer see the smoke. Hull (7) discovered that blindfolded subjects could not distinguish between tobacco smoke and steam when both were drawn through the stem of a pipe. In an experiment by Eisenson, Fisichelli, and Welch (3) it was found that subjects could be tricked into believing that one perfume was several other perfumes, and some subjects even indicated marked preference for one of the "samples." At each presentation the perfume was poured onto two pieces of blotting paper. The instructions were: "This may be the same perfume or two different types of perfume. See if you can tell which the case may be from smelling the samples." In another unpublished experiment students were similarly deceived into believing that a sonata was played better by one violinist than another simply because they were told that Heifetz played one time and an unknown violinist the other. In reality, the identical Heifetz recording was played both times.

The customary comment heard in such cases is to the effect that it just shows how suggestible people are. This tells us absolutely nothing, unless we were to insist on an operational definition of suggestibility and we have not yet found an adequate one. When we learn to prefer one brand of cigarettes it involves not only the taste (although we may think so) but also the package, possibly the size, etc. Our love of tobacco seems to include, among other things, the vision of the smoke. Any perfumer will describe the extremely important relationship of the odor of a perfume to its package and name. Even the name of a violinist can have a very important association with the quality of the rendition of a certain piece of music. In these cases it is a compound or complex stimulus which is involved in the acquisition of the preference. There are, of course, limits as to how far a substitute stimulus can be used as part of the compound. If the substitute stimulus is sufficiently different from the one which it is replacing, what we have just described will not occur. For example, if instead of placing a substitute brand of cigarettes into the package of the subject's favorite brand, we placed cigarettes filled with bits of tarred rope, it is unlikely that he would be deceived. This is certainly to be expected since there is a limit to generalization, the limit differing among individuals. In the situation of Pavlov's dog, once the animal was conditioned to a certain tone, it would salivate upon hearing similar tones. If, however, the substitute tone was too dissimilar, salivation would not occur.

A demonstration of the full power of the elements of conditioning can be found in certain cases of drug addiction. Lindesmith (10) reported cases where drug addicts have gone as long as 15 days with injections of a saline solution and have reacted just as they would to morphine, simply because they believed they were receiving the drug. He also reports cases of veteran addicts who found out that they were thus being fooled and consequently experienced no relief when actually given morphine because they were still under the impression that they were receiving the saline solution. Might it not be true the "suggestibility" here is simply due to the conditioned association?

Razran (14) has demonstrated that human subjects learned to prefer modern music, which they heard while eating, to classical music which was not reinforced in this way. The sound of the music, coupled with the satisfaction of a basic physiological need, conditioned their preferences.

Skinner (16) gives examples of acquisition of tastes in terms of primary reinforcement or generalized reinforcement.

Gardner Murphy (13) has treated the subject under the heading of "Canalization". Murphy prefers to explain many acquisitions of taste in terms of canalization. He takes pains to present a long description of the differences between conditioning and canalization. At several points in our discussion he might well say that what we consider conditioning he does not, but we use the simple criteria mentioned at the beginning of this article. Murphy appears to be attempting to define canalization in terms of long lasting conditioning. We are merely concerned with the common denominators or factors in both canalization and conditioning, or any other theory regarding the acquisition of preferences. The confusion appears to exist in connection with what one means by a conditioned stimulus or signal. Such trouble will always arise if one returns to the old and generally abandoned notion of a simple conditioned stimulus. This signal, or conditioned stimulus, may be a characteristic of the unconditioned stimulus, such as the greenness of the pickle which stimulates salivation, or a characteristic of the conditioned stimulus, such as the smell of the printer's ink, or several characteristics of one or both. The possible mathematical combinations, especially when we include the possibilities engendered by generalization, are very numerous indeed, and far from simple. This is not orthodoxy on our part.

We are not committed to orthodoxy since we are simply pointing out common elements in admittedly conditioned and so-called canalized situations. Murphy refers to an animal conditioning experiment as one which merely activates a preparatory as opposed to a consummatory response. He states that when the hungry dog licks the light bulb which is the food signal, the light bulb does not satisfy the animal's hunger, while food does. Analogously, we referred to a learning situation in which a child learned to like the taste of oysters. The mere flavor does not satisfy hunger any more than does the smell of printer's ink alone make the journalist believe that he is a good editor. Murphy posits the extinguishability of conditioning and the unextinguishability of canalization. In our later topic on fears and phobias we shall discuss the distinction between conditioning which is readily extinguished and conditioning which may last an entire lifetime. Later on in his chapter, however, Murphy admits that canalization may not be quite so unextinguishable as he first maintained. Here, as in all other life situations, there can be no sharp distinction between extinguishable and unextinguishable, although we admit the utility of classification. We perceive a continuum whereby the duration of a response, or taste, or type of behavior, depends on many conditions both internal and external. It would, of course, appear logical in this connection that those conditioned stimuli which satisfy basic physiological needs such as hunger and thirst should maintain longevity of preference, but even these are subject to extinction, or apparent extinction, in the sense that the conditioned response may never reappear.

In this section we have endeavored to explain how the human organism may come to like or dislike certain stimuli or patterns of stimuli because of their contiguous association with the satisfaction of needs. Such associations are not always adequate; consequently, the individual does not always learn to like such stimuli. For example, a man may tell us that he still dislikes the taste of all alcoholic beverages but he takes them just for the effect alone. We have been discussing people who learned to like certain things and certainly not those who failed to do so. The cases we have mentioned in connection with the drugs are not to be considered the general rule. The mere fact that such forms of conditioning have been found at all should be sufficient to indicate that we have at least demonstrated that even the effects of drug addiction and withdrawal can be reversed by principles of conditioning.

2. *Perception*

The customary textbook approach to this subject is to consider perception as one of the basic mental processes, in the same category as memorizing, recall, generalization, etc. Hebb (5) has done more than anyone else so far in pointing out the complexity of this process. In discussing visual perception, he has referred to one phase of perception as a reaction to the different gradients of luminosity. But, in addition, he has stressed the part that identification plays in perceiving. An object, say a pencil, is held in front of a subject and he is asked to name it. Almost instantly he will respond "a pencil." Two processes have occurred—first—the light rays reflected from the object have impinged upon the retina of the subject and impulses have traveled along the optic nerve to his brain, thus making an impression, and—secondly—the effect of the first process has elicited the revival of past impressions in his brain which makes it possible to identify the object. When he was first shown a pencil as a small child he had to be told that this was a pencil and this was repeated many times. Hebb refers to the work of Senden reporting on the visual experiences of adults who, after operations, have seen for the first time in their lives. We are reminded in this study of James' "buzzing blooming confusion" of the newborn infant as it concerns sight. These gradients of luminosity have no meaning to these previously blind adults. Process number one, above, is active but there is no process number two as yet. In ordinary psychological jargon, these people have not had the opportunity to establish any visual cues. How is such an establishment brought about? What is a visual cue? A specific but meaningless pattern appears in the visual field of such a person who has just gained sight and he extends his hands and feels something. It *feels* like a chair. He sees another similar pattern and this too feels like a chair. He may ask and be told that it is a chair. Each and every time he sees such a pattern it again feels like a chair. Every time Pavlov's dog was presented with food it salivated. Every time the formerly blind person has certain visual sensations he finds that he is touching something that feels like a chair and that he may sit upon. At first the newly sighted person probably had no identifying reaction when he experienced the visual form of the chair. However, just as the bell eventually meant food to the dog who had experienced food along with the bell on so many occasions, so too, the visual pattern of the chair means chair to the formerly blind person who has experienced the feel of the chair on a number of occasions, and who has had verbal reinforcement to the effect that this object is a chair. This learning of visual cues may be a long process; conditioning requires reinforcement. The formerly blind person will eventually have no difficulty since, from now on, every time he perceives the image of a three dimensional chair it will be associated with the tactual and kinesthetic sensations of a chair if needs be, as well as with the word *chair*. This will always be available to him. Thus it appears that the development of perception involves a form of conditioning uncommon to other mental processes. Within the realm of perception the conditioning processes seem to be forever reinforced or reinforceable.

After some learning, every time one sees a flying missile coming in the direction of his head, he ducks in anticipation of being hit. As far as we know there is but one exception and that exception is an example of conditioning as well. We refer to motion picture demonstrations of the principle of binocular difference. The audience, with their special spectacles, watches a motion picture of a batter hitting a ball straight out into the theatre and everyone promptly ducks, or, at least, begins to. Surely every person knows, if he were to intellectualize, that it is only a picture on a screen but the conditioning process is so firmly established that the incipient motor response occurs first. The visual appearance of the ball on the screen has become the conditioned stimulus for the real ball. Thus we may state that we perceive what we are conditioned to perceive. The savage in the jungle sees and hears insects and animals which are unperceived to us and it is entirely probable that such a person would be in a state of complete confusion at a cocktail party, perceiving very little of the detail. In both cases the light rays would be acting in a similar manner upon the retinas of the savage and the civilized man but the cues would be entirely different in terms of the different experiences or conditioning of the two individuals.

3. *Language*

This topic shall be extremely brief since Allport's theory of the development of vocabulary has become a classic in the annals of psychological theory. In our own language we might say that if Pavlov had said "food" instead of ringing a bell every time he presented the food, the dog would have conditioned to the sound of the word "food" instead of to the bell. It could then be said that the dog responds to a word and in this manner dogs do learn comparatively few words. Similarly, the child hears the sound "ball" on many occasions when the ball is presented. Eventually, when he hears the word "ball," it may be that the visual impression of a ball is revived in his brain. In the classical, or Pavlovian conditioned situation an involuntary response such as salivation is involved. Hence, when the signal or conditioned stimulus is presented, the animal has to make the involuntary response. In the realm of language, however, we may say "ball" or "get the ball" to a child and it will revive the visual impression of a ball but if he does not choose to fetch it he will not. The motor response is voluntary or checkable. Still, the revival of the impression of the object or quality associated with the word stimulus is not. The concept of voluntary and involuntary certainly applies to the revival of impressions. Once the sound or word "ball" has become associated with the visual impression of various types of balls, it becomes impossible for one to inhibit the revival of some past impression of a ball whenever he hears the appropriate sound. Of course the entire structure of the sentence in its situational context must be considered. On it depends whether the word "ball" will elicit the image of a dance, or toy, or globe, or any other kind of ball. In any event one image will be selected and is available through past association.

There is this distinction, also, between the Pavlovian situation and that of a child learning a vocabulary: the stimuli in the first instance were presented in the same manner each time, the unconditioned stimulus (food) following the conditioned stimulus (bell). Great precautions were taken to rule out other distractions. When we turn to the child's situation such distractions are obviously not ruled out. The round toy ball associated with the word symbol is located in different places and presented under different circumstances. For example, at one time it is located on the floor, at another under the table, or it may be pointed at, grabbed, thrown, etc. The common denominators each time, however, are the shape of the ball itself and the word. In this process of learning language the child comes to associate other symbols with other aspects of the ball situation, e.g., the word "point" with pointing, "catch" with catching, the command to "put it away" with the act of putting the ball away, and many other things, too. He is not in a soundproof laboratory systematically learning words in isolation. Thus, although there is similarity in both situations, we cannot neglect the fact that the learning task in the case of the child is ever so much more complex than that of a dog in a laboratory or even in a home. We would point with pride to the vocabulary of an unusually bright dog who responded to 150 words, if there is such a dog. Yet, if we compare this to the 15,000-word vocabulary of a bright human adult, we can see that in this respect alone we have a human brain which is 100 times more efficient than that of a dog. Nevertheless, both have been conditioned to language, the extent of the conditioning varying with maturation and physiological capacity.

The structure of the sentence may be considered a second form of language. The meaning of a word changes as its position in the sentence changes, e.g., John hit Mary. Mary hit John. Mary is at one time the performer and the next time the recipient of the action. By contiguous association we learn both the first and the second meanings of words. Once the child has learned what "drink" and "milk" mean, as well as what "mama" and "baby" mean, he can learn the difference between "mama drinks the milk" and "baby drinks the milk." The contiguous association of the words produces their characteristic meaning in terms of the individual's conditioning.

4. *Fears and Phobias*

There have been many classifications of fears such as: simple or conditioned fears; contagious fears, or fears that have become associated with the manifestations of the fears of others; instructed fears, or fears that result from verbal teaching; social fears, or shyness and timidity resulting from a feeling of inadequacy; and phobias, or abnormal fears. The implication of such classification is that there are basic differences in these fears. Perhaps this is so but we shall see to what extent, in all these instances, we can explain the development of the fears in terms of the elements of conditioning.

a. Conditioned fears. Most authorities would agree that the earliest type of fear is that which is generally described as the simple conditioned fear. The child is first attracted by the flickering yellow flame of the candle, then touches it and is burned. In consequence he is *afraid* to go near another lighted candle. Or, at one time, the child may walk into the water at the seashore without the slightest hesitation. If he is hit by a strong wave and perhaps submerged for a few seconds, he may become afraid to go near the water's edge. The child learns to fear fire and water in this way, and the process of learning here is no different from that found in the learning situation of Pavlov's dog. In the case of the child the sensation of pain and the sight of the candle flame have become associated so that, when the child sees the flame alone, he makes a similar response to that which was elicited by the painful stimulus. This response not only involves withdrawal but the autonomic reactions which have been described as being peculiar to the emotional state.

Watson (17) was one of the first to establish experimentally conditioned fears in children. At the moment when a subject was about to pick up a rat with which he was accustomed to play, an iron bar was struck behind his back. The sudden loud sound constituted an unconditioned stimulus. After five further repetitions of this noise in the presence of the rat, the child learned to associate the sight of the rat with the shock of the loud noise. As a result he became afraid of the rat. Moreover, this fear was generalized so that any stimulus that even remotely resembled the sight of the rat elicited the fear response. Hence, when the child perceived a large wad of cotton on a tray, he reacted with a display of fear, just the same as he had to the rat. Young children often develop fears that are not easily explained in terms of evident causes. Such fears are the result of wide generalizations. In other words, the child generalizes his fear from the conditioned fear stimulus to other objects because of some slight resemblance they bear to the former.

Watson was of the belief that the infant is innately afraid of two things—a loud sound and loss of support. In reality, neither is *necessarily* a cause of fear but may shock or startle the organism. There is no reason to believe that any gross stimulus, whether it be a light (or the sudden removal of light), a sound (or sudden silence after music or hubbub), a tactile stimulus (or sudden removal of support, which is tactile) will not elicit a startle response if it is sufficiently intense. Many fear conditioning experiments have been performed since the one we have described, and several modifications of Watson's principle that fears are natively elicited by loud sounds and loss of support have been introduced. For instance, it has been found that a loud sound which may startle one child may not affect another, or, that a sound may frighten a child on one occasion and not have this effect on him at another time. Obviously, the sounds that these experimenters are referring to are of moderate intensity. It would be difficult to believe that such variable responses to a sudden loud sound would be obtained if the experimenter had used a 16-inch gun at close range. The effect of moderately loud or intense stimuli, such as a bell or a gong, will be influenced to some extent by such variables as the child's constitutional sensitivity to auditory shock, his state of health, degree of fatigue, presence of a parent, the extent of his attention, and the total situation in which the stimulus was presented.

b. Contagious fears, or fears that have become associated with the manifestations of the fears of others. Children are not born with a fear of snakes or a fear of lightning but they will learn to fear such phenomena if they perceive that manifestations of fear in adults are elicited by them. Masserman, however, has stated that a monkey will flee the very first time he sees even a toy snake. We believe this is probably due to some generalized association. The development of this type of fear in humans can be explained in two ways. First, the adult's manifestation of fear may in itself elicit a strong startle response in the child. In other words, it may in itself constitute a shock. For example, if a mother suddenly jumps and shrieks at the sight of a snake in the presence of her child, her scream might be the factor which startles him. As a result the sight of the snake will become a conditioned fear stimulus in much the same way that the sound of the bell became a conditioned stimulus for Pavlov's dog. Secondly, the parent's manifestation of fear might *already* be a conditioned stimulus. It is entirely plausible that on many occasions in the past such a manifestation might have become associated with painful or shocking stimuli. Mother might very well have screamed when baby put his finger into the candle flame or when the wave engulfed the child. If this is true, then when the adult manifests fear at the sight of the snake, the child may now become conditioned to fear the snake. The child has been conditioned to respond with fear to an adult manifestation of fear.

c. Fears resulting from verbal teaching. When a child has gained sufficient knowledge of language he may associate a certain phenomenon or stimulus with pain or shock. For example, stories about ghosts, burglars, animals which attack in the dark, etc., are remembered and associations are set up. Thus, when the child hears a noise at night the word *ghost* or *burglar* is suggested to him by association with the dark and sound, and he responds with fear to this association. Also, we have situations where a parent specifically states, and frequently repeats, such admonitions as: "Be careful crossing the street. You may be run over." "Don't let anyone in while we are out. They may be burglars." The child is so conditioned to the danger of these eventualities that he may well tremble when he crosses the street or hears a knock at the door when his parents are out. If such a conditioned fear should happen to be reinforced by the house being burglarized or the child knocked down by a car, the conditioned fear may never be extinguished.

We cannot prove that conditioning may *never* be extinguished because if a conditioned response lasts for two or 10 or 20 years in an individual up until the time of his death, someone might argue that if he had lived one more day or year or decade the response might have become extinguished. Suffice it to say that many conditioned responses, including conditioned fears, last an entire lifetime but this cannot be proved in the experimental situation, mainly because experimenters are unable to produce sufficiently traumatic situations in the laboratory. Learning to fear in this manner appears to be extremely complex; still, the principles governing such learning are the same as in the other types discussed.

d. Social fears.

(1). *Timidity and shyness.* In virtue of various unpleasant experiences he may have had in the past, the child may experience some slight fear reaction when he meets a new person or persons. He may even exhibit fear when all the elements of a situation are familiar because some combination of these elements is associated with past trauma. A common example is related to the child's experience with the doctor who was first met when he gave an injection, or to the nursery school teacher or governess, the first meeting with whom meant the disappearance of the parent to the child. Thus, meeting a new person arouses a feeling of fear, especially if anything about the new person suggests an unpleasant past experience. A verbalization of the anticipation of pain or unpleasantness (in this case, perhaps, social injury) might take the form of "Will these new people like me? I had better not speak too much because they might hurt me or tell me to be quiet. There is something about that man which makes me feel funny. Maybe if I'm quiet he won't notice me, etc., etc." Here the conditioned stimulus is the stranger or strangers whom the individual encounters, and the conditioned response is a fear response. The verbalization of the fear is frequently in social terms which sound logical instead of in the unremembered physical terms aroused by the original unconditioned stimulus.

(2). *Phobias.* These are abnormal fears, the causes of which are unknown to the individual or, if known to him, are immoderate in degree. It would seem that in the phobic situation an individual is conditioned to a certain aspect or characteristic of a trauma which may be only accidental. Let us consider a few examples:

Three young children are taken into a London air raid shelter. Portions of the walls cave in but none of the children are physically injured. It turns out that two of these children develop phobias. One becomes claustrophobic; another is frightened by any small toys; the third appears unaffected. It could be explained that, at the moment of trauma, the first child's attention was centered on the falling walls while the second child was playing with his tiny toys. Of course, it must be understood that the effect of the trauma depends on the total configuration. Were the children hungry or tired? Were the parents present? Prediction in any one case is not possible but where a phobia does result we believe it has developed in this manner. Here we have a generalization from a particular aspect of a situation rather than from an object. Now any situation which contains this quality will produce fear. Closed doors will revive the trapped feeling as the walls were falling to one child; small toys will do it for the other. Now let us consider two more examples.

Two sailors have suffered severely from aerial attacks during the war. One will startle and become panicky if a bee or fly suddenly buzzes near him; the other will startle if he perceives the sudden flare of a match. In the case of the former, the hum of the attacking planes overhead was the characteristic of the trauma situation which became associated with fear; in the case of the latter, the sudden flash of flame became the conditioned stimulus characteristic of the situation.

In any of these cases the cause or conditions of such contiguous associations may be forgotten. Hence, the patient may say, "I haven't the faintest idea why this frightens me." But, though the cause may be forgotten, it does not follow that the association with the characteristic in question (e.g., the hum or the flash) has disappeared. Even if one does remember the cause and says, "I become panicky whenever I am in any closed space. This has been the case since my nurse locked me in a closet when I was four," he may be unable to control the response, and the phobia persists.

On one occasion one of the authors perceived a rapidly approaching car while riding in a cab. He had time to wonder whether the driver could stop quickly enough, which he did not. As a result a collision occurred and, although the writer was not physically injured, he felt panicky for two years afterward every time he was in an automobile and perceived an approaching vehicle. Despite all reasoning he was just unable to control the autonomic response. We have heard of many similar cases where injury has occurred and where the fright has persisted for many years, and even for an entire lifetime.

Gantt (4) cites an instance wherein Pavlov reports an occasion where several of his dogs were trapped for three days in a flooded cellar. As a result they were frightened by the sound of running water for months and years after. Too often our principles of conditioning are limited by the results obtained in our psychological laboratories. Many experimenters have reported that an increase in the strength of the unconditioned response will not increase the rate of conditioning or decrease the rate of extinction (18). Within limits this is certainly true but it would appear that beyond these limits it is not. For example, suppose that we increase the voltage of a shock in a conditioning situation from 20 to 30 volts. It is unlikely that this will bring about any change in the rate of extinction. If, however, one were to deal with voltages which approach lethal intensity, one might expect a very different story. The traumas which we have been discussing in the real life situations are far greater than any of these laboratory electric shocks. Ten years ago Hull described a new conditioning experiment to one of the authors. The most exciting part of the story he merely commented on in passing. "You know," he said, "we have given these rats the unconditioned stimulus only three times. We have used 110-volt shocks in their tails and we have been testing them every day for three months and as yet there is no sign of extinction."

One hundred and ten volts is a violent trauma for a small rat and here, in a laboratory, we begin to see results approaching those produced by the super violent traumas of the outside world. Richter (15) developed an experimental method for producing a fear of being poisoned in wild rats. Some of these rats developed such intense fear that they refused all food and so actually starved to death. Thus we have a laboratory experiment where fear was so intense in some cases that it apparently superseded even the basic physiological hunger drive and where this fear was not extinguished until death. This same experiment included some rats which did not seem able to learn to distinguish poisoned food and so finally died from eating it, as well as other rats which did learn to distinguish and simply avoided the poisoned food and ate the non-poisoned food. Here again we find much individual difference, and differences between strains. We merely wished to make the point that, where trauma is sufficient for any particular individual, the fear so conditioned *may* be unextinguishable unless a deliberate course of "deconditioning" is undertaken. We will discuss this later in the section on Psychotherapy.

5. *The Lie Detector*

Strictly speaking, the lie detector only detects an emotional reaction during the telling of a lie. The psychogalvanic reflex is elicited by the slightest startle or emotion. The psychogalvanometer will register a response from the subject when a match is suddenly struck or hands suddenly clapped in the presence of the subject. A slightly embarrassing question which the subject himself denies has affected him at all can cause a marked deflection of the needle of the galvanometer.

Most people have been fear conditioned from early childhood against the telling of lies. Prevarication has been continually associated with punishment, shame, and disgrace. Not only is this so as far as the individual's own experiences are concerned, but he has also observed the fate of others who have been caught in lies. Throughout his life he is constantly reminded of the ignominy of lying. Indeed, one of our national myths, which is passed on to every child, is the story of George Washington and the cherry tree. Truth is exalted, lying debased. In the language of reflexology, this fear conditioning is constantly reinforced. Of course, this varies with the experience of each individual. Thus the person who lives in a household and works in a place where lying is commonplace receives far less reinforcement and reacts far less when he has occasion to lie. This lack of negative reinforcement may be behind the story of many so-called psychopaths, as we shall discuss below.

Experiments (9) have shown that when students are asked to tell a "white lie" (e.g., to deny that a certain number is the one they picked) the response can be detected by the lie detector about 90 per cent of the time. In another experiment (1) this reaction to lying could not be offset by giving the subject an electric shock every time he told the truth. The early, deep-set fear conditioning to lying was stronger than the very recent trauma of the electric shock associated with truth telling. Thus it may be said that the lie detector is a method of revealing an individual's conditioned emotional response to lying.

6. *The Psychopathic State*

Nothing can arouse more controversy than the definition of the psychopathic state. Koch proposed the term as a substitute for Pritchard's term "moral imbecility." Henderson felt that the word imbecility was misleading since so many psychopaths are extremely intelligent. Our own personal opinion is that the older term was more precise and more descriptive. The term "musical imbecile" implies nothing more than that an individual is imbecilic insofar as music is concerned and nothing else; such a person might be a genius in some other field. Morality, we believe, is not only a very definite product of learning but one of the most difficult concepts to learn. Unlike other disciplines, its aspects are twofold. One aspect involves learning what *not* to do in violation of the moral code, and the second part involves learning to fear such violations, frequently in terms of a life beyond the present one. Certainly the psychopath knows the 10 Commandments and may be able to recite them perfectly. He has not, however, been sufficiently fear conditioned. That is to say, he has not learned to be afraid to kill, steal, or lie, and when he has done any of these things he suffers little or no remorse. He has probably not been really punished when he did wrong. No furies haunt him nor is his sleep disturbed. Precisely why most individuals do accomplish this moral learning while a few do not is something we are unable to explain. In most instances the psychopath has apparently received just as much training as his normal brothers. He is given the same reminders—teachers in blue uniforms at every street corner to aid him in recalling that crime does not pay. Like everybody else he has had the opportunity of reading about the wretched fate of those who have transgressed the law, but still he does not learn to be frightened. Let us say that one particular psychopath has been repeatedly warned and punished, whipped by his parents, expelled from school, served time in several reformatories and jails, and yet, despite all this, he has not learned moral fear or shame. For him the punishment itself may have been need-reducing or actually pleasurable, acting as a positive reinforcer. Can we find a parallel to this in a controlled experimental situation?

The hypothesis that we have presented, suggesting that the psychopathic state might be explained in terms of conditioning, would be quite naïve if not integrated into a much larger pattern. If this confused term is to be used at all, we must realize that it may involve the following interpretations: (*a*) A symptom or type of symptom of one or several psychoses (e.g., this schizophrenic behaves to a greater or lesser degree in a psychopathic manner; that schizophrenic does not). (*b*) What is referred to as psychopathic behavior may be the result of direct or indirect aggression. A case history may clarify this point. A child of 12, the daughter of wealthy parents, is caught stealing food, apparently for the sake of stealing, and she manifests no sense of guilt whatsoever. She appears to be even proud of her deeds. A superficial diagnosis could brand her as just another psychopath. A further examination into the history of the child would reveal that her hostile mother offered fruit to her two sisters, but begrudged her taking any. This was the culmination of many such acts on the part of the mother. As a result the embittered child decided that whatever happened, she would accept as little as possible from her parents. She could not earn money to support herself. Hence, she would steal, do anything rather than accept favors from such a mother. The child's hostility was such that whatever shame she had learned to associate with stealing was overcome by a far greater hatred of her parents. (*c*) The lack of adequate conditioning such as we have suggested in this topic. (*d*) A combination of (*a*) and (*c*), or (*b*) and (*c*).

While many authorities insist that the family life of the psychopath was not a "normal" one despite its apparent normalcy, we suggest the possibility that this hypothesis may be carried too far. We believe that most cases could be summed up by "faulty training or conditioning."

Let us return to Pavlov's dogs. It was arranged that every time a dog went to eat food from a certain metal plate, he received a shock. After a limited number of trials he refuses to go near the plate. If his hunger and fear of shock are sufficiently strong, he may even develop a neurosis in time. The dog is fear conditioned to eating out of this plate. He has learned what happens if you do a certain thing and he abstains from doing it. But, not *every* dog conditions. Some may keep on going to the plate forever despite the pain, apparently being quite willing to suffer the shock on the chance of getting the food. The difference between this situation and that of the psychopath is that, in the case of the dog, only the fear of pain is involved. In the case of the psychopath, we are dealing not only with fear but the more subtle shame, or conscience. The normal individual speaks of integrity and says, "Even if I were not caught stealing, I could not live with myself if I committed such a crime." Here fear, within the realm of the individual's social environment and training, has reached a high degree of generalization. We point out a lack of fear conditioning in reference to some portion or portions of the field (e.g., the psychopath may be afraid to lie but not to kill, or vice versa). But psychopaths have a strong superego in some respects: i.e., never welch on a job, never greasing a cop, etc. In psychoanalytic terminology, this is not unlike a failure to develop the superego. It would probably be more correct to say that the psychopath has developed a faulty superego.

It is interesting, in passing, to note that while, as we have previously mentioned, the non-psychopath usually gives a marked psychogalvanic reaction to a slight misstatement of fact, the psychopath or pathological liar manifests little or no psychogalvanic reaction to huge falsehoods and confabulations after violent transgression of the law.

While there has been much discussion of the relation of psychopathy to drug addiction, we do not believe that the balance of opinion or evidence is overwhelming either in the case of those authorities who state that all drug addicts are psychopaths or those who claim that there is no relationship other than a chance one between the two. Lindesmith (10) reviews the literature and experimental evidence on this subject and comes to the same conclusion, namely, that in the absence of control groups, no definitive results have been shown. Nevertheless, there are certain aspects of drug addiction which appear to be pertinent to a discussion of elements of conditioning in human behavior.

One of these is the fact that there are numerous cases on record in which persons who regularly received opiates for long periods of time did not become addicted. These are said to be habituated. Lindesmith applies the term "habituation" to "that condition in which the physiological factors occur in isolation, without arousing the self-conscious desire for the drug which characterizes the addict and around which he organizes his life." One might very well ask just what causes some people not to become addicts and what caused some of Pavlov's dogs not to condition. We are not pretending to answer all the questions which might arise in this connection but we merely suggest a few of the variables with regard to the dog, such as his appetite, intelligence, age, state of health, etc. In the case of the addict there is the exact size of the dose, the state of his mental and physical health, and his knowledge of what he was getting, just to mention a few of the very complicated factors which Lindesmith has brought out. Lindesmith has also stated that addiction "depends upon those complex functions which are made possible only by the existence of the symbolic structures of language." He states that animals only have a tolerance for drugs whereas humans have a craving, and denies that any animal has ever been addicted. The human and animal situations cannot be compared. If the human addict were put in a cage like a monkey and never allowed to get in contact with drugs, it would be impossible for him to behave like an addict and, likewise, if the monkey were set scot free and given the money and opportunity to consort with drug peddlers, he might become a real addict, although Lindesmith denies this. The monkey, then, like the human would have control of the situation instead of the experimenter "pulling the strings."

Another point which should be made is that one might very well say that the habituated narcotic taker and Pavlov's dogs who kept on taking the electric shocks were actually conditioned. Pavlov's dogs approached the plate with trepidation and in some cases developed neuroses but apparently the situation was not sufficiently traumatic to overcome the hunger drive which was being satisfied with the food. Perhaps the shock became a signal for the food. As for the habituated drug taker, he goes through all the withdrawal symptoms when he ceases to take the drug, but he does not know that he is addicted and may associate his symptoms with his illness, or with grippe, etc. In other words, the physiological picture is the same as for the true addict but the psychic aspects differ, chiefly in terms of the association or generalization which accompanied the reinforcing effects, such as the feeling of well-being, pleasantness, etc., of the drug. Thus, this may be a question of conditioning hierarchy rather than the mystery of non-conditioning. The association is made to the illness rather than the drug.

7. *Hypnosis and Suggestion*

For generations hypnosis has been explained in terms of suggestion or suggestibility. Of the many confusing definitions of suggestion which have been advanced, those which are synonymous with gullibility seem to be clearest. If we keep this type of definition in mind, its relation to hypnosis may become more apparent.

Very young children are rated more suggestible than older children by tests such as the Otis Suggestibility Test. We would quite naturally expect the younger children to be more gullible since they have not yet learned what liars adults may be. As time goes on they discover that grownups are fallible in this respect. Then they think twice before they believe. This process is precisely the reverse of what occurs in the hypnosis situation.

In the hypnosis situation the subject learns in a fairly limited space of time that all the hypnotist's predictions come true. If the man has a reputation and the subject expects to be hypnotized, this has a great effect on the probability of the result. In the past the subject knows that when people were acclaimed as authorities in different fields, he has found that they were worthy of their reputations. Therefore, when some man is reputed to be a great hypnotist, by the same process the subject comes to believe it. When the young college student attempts to hypnotize his classmate, who is frankly dubious and unimpressed, he may experience great difficulty and be unable to obtain hypnosis even though he uses precisely the same technique as the "Great Doctor Dazo."

Let us examine a typical hypnosis situation and consider whether or not the process may be explained in whole or in part by certain principles of conditioning. Such conditioning would not, of course, be classical but let us first describe it and then assign a suitable term.

We quote from a previous article by Welch (2): "The hypnotist's instructions are directed in those channels which produce the physiological participation of the subject. The hypnotist asks the subject to stare at a bright light. The subject does so and his eyes become tired. Consequently, when the hypnotist says, 'Your eyes are tired,' the subject's eyes are indeed tired from staring at the bright light." Through a series of such incidents, involving other sense modalities, the hypnotist becomes to the subject a person of prestige in that every time he made a statement it proved to be true. Once the hypnotist has established himself in this position of being an authority he may give an instruction which will cause the subject to act as though it were true on the basis of the subject's generalizations.

The experiment cited in this article was designed to determine whether a generalized conditioned response of the *PGR* could be evoked in an experimental situation which parallels the conditions produced by the hypnotist. In this experiment a word flashed on a screen was used as analogous to the spoken word of the hypnotist, always followed in the experimental group by the phenomenon for which the word was a symbol. Thus the word "music" was always followed by the playing of music. After a number of such trials, the words "electric shock" were flashed on the screen and were not reinforced. If the subject generalized according to our hypothesis his response would be as though the critical stimulus had been reinforced. In two comparable groups of subjects, where one group received reinforcement of prior stimuli as described above and the other did not, the former group gave five and one-half times greater response to the stimulus "electric shock" than the latter. These facts would indicate a definite conditioning process, which can at least in part explain the phenomenon of hypnosis.

It would seem that in producing a conditioned galvanic skin response to a conditioned stimulus which was never reinforced, we have produced a new type of conditioning. This is not the generalization of Pavlov's dog who, through reinforcement by a bell to Pitch *A*, now salivates to a bell of slightly different pitch. This is a specific type of generalized conditioning where we are dealing with conditioning factors of past associations. This different generalization which we built up in the subject through the use of word symbols to produce a conditioned response to a stimulus which was never reinforced may be called *abstract conditioning*. Abstract conditioning, in conjunction with what Pavlov called higher order conditioning, along with generalization, might explain many forms of human behavior which have been considered far beyond the realm of reflexology. It would certainly include forms of conditioned symbolization which related to much material discussed in psychoanalysis, some of which we shall deal with in our section on psychotherapy.

8. *Hysteria*

In a previous study by McGill and Welch (12) hysteria was explained as a conditioning process. The point was made that hysteria, like other psychoneuroses, stems from emotional conflict of considerable duration and intensity. The distinctive feature of hysteria is that it represents a solution to the hysteric, arrived at through conditioning, even though the solution may be unacceptable to the community or consciously deplored by the patient. There appear to be six necessary steps or factors in the process of hysteria. These are:

a. Motivation. This is provided by the conflict itself and the need for resolution when it becomes untenable.

b. The somatic condition. The patient must have some little ailment in his present repertoire or some past one which he can recall, which will serve as a precipitating factor. In some cases this may not even have to be personal with the patient but may be something, like an epileptic seizure, which he has observed and which made a very strong impression. In the case of utilizing his own illness, something as slight as a toothache or a touch of rheumatism will serve. But, if it is something he has observed, then a much more dramatic event like a seizure or a paralytic stroke is necessary to set up the chain of events.

c. Association of the somatic condition with a syndrome. The patient extends the original observed or personal bodily condition with a syndrome, inevitably a serious and dramatic one, like blindness, paralysis, cyanide poisoning, complete amnesia, etc. Almost always this choice of syndrome is in complete accord with the patient's education and level of sophistication and does not make medical "sense." It is the patient's garbled version of a particular illness.

d. Association of the syndrome with escape: The particular syndrome selected must offer escape or solution of the original conflict. If it keeps the young man from marriage, or the young lady from taking care of her invalid mother, it solves the problem. In addition to this, if the hysterical manifestation provides what in Freudian terminology is called "secondary gain," it will be most difficult to treat.

e. Weakened health conscience. This is a feature which distinguishes the hysteric from the malingerer. The malingerer does not object to feigning in order to accomplish his end but the hysteric would be ashamed to do so. On the other hand, the hysteric does not take pride in his health; he does not feel obliged to have "mens sana in corpore sano." His obligation to be healthy has been weakened either from the actuality of many little illnesses, by his doting parents always treating him as a "delicate" child, by observation of epidemics, or perhaps by the scenes of mangled bodies which occur in wartime, etc. He is not, in any event, one of those people who pride themselves on practically never being ill.

f. Fixation, or poverty of distraction. By this we mean that conditions must be present which permit the patient to narrow his range of attention so that he has opportunity to dwell upon his body. This will occur either when there is a tremendous poverty of distraction as when one lives alone in a furnished room, or when the pressures of distraction are so great that one can be rescued only by Janet's "La Belle Indifference" and he concentrates on himself, ignoring the turmoil around him. The purpose of occupational or recreational therapy is to offer the necessary distraction. So is the advice one woman frequently gives another to "go out and buy a new hat." The old saws to the effect that work never killed anyone, and that the devil makes mischief for idle hands, are other illustrations of the same theme.

We have stressed the matter of individual differences, both constitutional and in terms of previous conditioning, many times before. It is now our contention that, given the stressful or conflict situation (Point 1 above) and the weakened health conscience (Point 5), the patient associates a somatic condition (Point 2) with an appropriate syndrome (Point 3) which offers escape (Point 4). If, in addition to this chain of factors he achieves fixation, or poverty of ideas (Point 6), he will produce hysteria. All of these factors are necessary and any circumstances which help produce them will contribute to the process as, for example, lack of education and low *IQ* which reduce association and distraction. The somatic condition might be compared to an unconditioned stimulus and the hysterical syndrome to the conditioned stimulus.

We believe that the value of this type of discussion lies in the fact that there are six vulnerable points offered to the therapist. He can work on the health conscience, the poverty of distraction, the original somatic condition, the building up of insight into the inaccuracies of the hysterical syndrome, other means of escape for the patient, or even on the original conflict. They are all links in the chain of hysteria, which is a learning process throughout. If the patient did not see, hear, or read about an appropriate manifestation and if he did not connect it with escape, he would simply spill over into the old-fashioned smelling salts variety of hysterical fit which was about the best that young ladies of the Victorian era were able to produce.

We should like to comment at this point that, within the realm of psychopathology, classification is often very difficult. Occasionally we will come upon the classical textbook variety of hysteria dealt with in our previous discussion, but the psychiatrist in the practical task of diagnosing various mental disorders will come upon cases where there is almost as much justification for considering the patient an anxiety neurotic as a hysteric. For example, in one case the only one symptom which may indicate hysteria in the classical sense is that the patient had two short episodes of hysterical paralysis of the legs throughout a span of four or five years of illness. All other symptoms, including anxiety, would tend to suggest anxiety neurosis. We must be prepared for these difficulties in any classification of mental disease where weeks of careful observation may be required in making a final decision as to whether a 50-year-old patient is, for example, suffering from involutional melancholia or a paranoic reaction. Hysterical symptoms may be removed quite easily by deconditioning but the underlying conflict and anxiety remain.

9. *Compulsions and Superstitions*

An important distinction between a compulsion and a superstition is that the compulsion is true of one or comparatively few individuals while the superstition is shared by many. For instance, you may say that you think me foolish for refusing to live on the thirteenth floor. I will admit that it may be irrational but point to the millions of other people who think the same way. The mere fact that many people share the same idea gives it great weight and no individual is looked upon askance for holding it. The compulsive, on the other hand, stands alone. His is the "foolish" reason. Let us take examples of childish compulsions from two case histories. The first concerns a seven-year-old child who received a high grade in arithmetic in school one morning after he had casually walked around the dining room carpet three times before going to school. The contiguous association of these two events produced a significant effect on this boy's behavior. For several weeks he felt compelled to walk around that table on the carpet lest he do badly in arithmetic at school. He was fully aware of how foolish this was and was fearful of being observed lest he be obliged to explain his nonsensical reason. Despite the absurdity of the situation, his compulsion was genuine.

The second case is very similar. In this instance a boy felt obliged to wear a brown suit and a green tie, since they had become associated with success in Latin. He argued and pleaded with his nurse to be permitted to wear both day after day, fearing that any other uniform would bring him failure. These are examples of contiguous associations such as we have found in the classical Pavlovian situation. They differ, however, from the pathological compulsive state insofar as reinforcement in the conventional reflexological sense was lacking. They became extinct because they were not reinforced. On several occasions, despite daily encircling, the boy fared badly in arithmetic. The brown suited boy, too, did badly in Latin while wearing the charmed combination. Further, when forced to wear a blue suit he did very well in Latin sometimes. The compulsion became extinguished in both cases.

In pathology this is not so. The contiguous association is deep set and is not easily affected by such a lack of reinforcement. Indeed, the nature of the compulsion is frequently such that the compulsive never skips the ritual to find out whether or not the feared result will ensue. Perhaps, too, he could not state what dire consequence he did fear. Many investigators refer to the symbolic significance of the compulsive acts in this state. For example, compulsive handwashing at frequent intervals is said to be symbolic of guilt feelings. Whether or not this is so, we are suggesting that contiguous relationships not uncommon to those discussed may be underlying. When a man goes back to his door three times every morning to make sure that the door is locked, he may have all kinds of symbolic associations attached to this act, but he has nevertheless observed that a locked door is one precaution against anyone getting in and that every time in the past when he has locked the door no unwanted one has entered. Just so the handwasher wants clean hands a great deal more frequently than the normal individual and he does what he has learned will produce clean hands. When his need for a tightly barred house or eternally clean hands is removed and the association broken at *that* point, only then will the compulsion cease. It would be as if the boy did get a high mark every time he wore the right outfit or performed his circular walk but finally was graduated and no longer had to study Latin or mathematics. In this case the conditioning process would have been extinguished by the permanent satisfaction of the needs involved.

In conclusion we can again compare the normal child's compulsion and the pathological compulsion to other forms of conditioning which are easily extinguished or last for an entire lifetime. For example, we can recall the early childhood fears which extinguished readily and the phobias which often last an entire lifetime without any external reinforcement. In situations which involve extreme trauma the contiguous relationship between the conditioned stimulus and the reaction seems to be the all important factor regardless of how inappropriate it may appear and perhaps regardless of its symbolic significance.

10. *Conditioning and Psychotherapy*

Jules Masserman (11) produced psychoneurosis in his cats by placing them in a situation where hunger impelled them toward the food box and where fear of a blast of air repelled them from this same goal. One of the most fascinating aspects of this study was the therapeutic method used by Masserman to reduce the conflict in this situation and dispel the psychoneurotic symptoms. The principles used are very similar to those that apply to the extinction of response in a conditioning situation. These are:

a. Disuse. Disuse in the Masserman situation concerned reduction of the conflict, either by removing the individual from the conflict situation or by reducing the strength of one of the conflicting drives. The hunger drive was reduced in Masserman's cats.

b. Negative adaptation, or forced solution. Masserman forced the subjects to become accustomed to at least one of the conflicting drives.

c. Social example. Other cats were put in with the neurotic cat which had the opportunity to observe the lack of fear on their part.

d. Reconditioning. This consists of allowing one of the conflicting drives to disappear, and was accomplished by discontinuing the air blast in the Masserman cat situation. This is somewhat similar to disuse.

e. Distraction, or working through. The conflict in the cats was lessened by the introduction of some element in the situation which gave the animals some control over the situation.

The terms Disuse, Negative Adaptation, Social Example, Reconditioning, and Distraction are textbook descriptions of the manner in which a conditioned response is extinguished. Such principles bear some relation to well recognized forms of hospital therapy.

When the patient is brought to a hospital he is removed from the conflicts of the outside world, which reminds us of the concept of Disuse in reflexology. Negative Adaptation or Forced Solution enters into the advice or supportive therapy given during the interview. Reduction of drives, at least temporarily, is accomplished by drugs, hydrotherapy, and exercise. Distraction, or Working Through, is related to occupational therapy and depth analysis where the patient views early stress situations in the light of maturity. Group therapy certainly utilizes the principle of social example. Reconditioning, or Working Through, may also be another way of describing what happens when the patient, in a therapeutic interview, utters words or performs acts which had formerly produced exclamations of disgust or horror from the patient's parent or teacher. Now this does not happen; the therapist is kindly and permissive. He may even say "Everybody has ideas like that" or "Most people do that sometimes." The fear or shame response may thus be extinguished.

It is to be noted that we are not endeavoring to explain these forms of therapy entirely on the basis of the language or reflexology, but we are calling attention to the fact that some elements of the conditioning situation are to be found to a greater or lesser degree within this realm.

11. *Conditioning and Higher Learning*

Hull's habit family hierarchy is an ingenious attempt to bridge the gap between classical and instrumental conditioning and possibly higher forms of learning. Prior to this approach, we find the rash generalizations of Watson on one hand and the suggestion that there is no such connection at all by others of the non-behavioristic schools. Even Hilgard and Marquis (6) cast some doubt on the possibility of such a connection. One criticism suggested by Welch (19) is concerned with recognizing the distinction between the involuntary response in the classical conditioning situation and the voluntary response in the instrumental one. Although the classical situation is usually referred to as Pavlovian, he actually used both classical and instumental procedures. In the classical situation Pavlov's dog *must* salivate when presented with the food. It is an uncheckable response. The rat in the maze, however, does not *have* to make any response at all. If he wants to, he may just remain motionless. Although the subject in the classical conditioning situation is supposed to condition to the situation as a whole, the experimenter has so arranged it that there is one dominant or several dominant stimuli in the general stimulus pattern, e.g.—food and/or bell. The one or several dominant stimuli in the instrumental conditioning situation or any learning situation of a still higher order *is determined by the subject himself and not accented by the experimenter.* These two points in themselves are sufficient to create learning situations of far greater complexity, but which still can include some of the elements found in the classical conditioning situation.

Skinner, in rebelling against the one factor theory, has replaced the concepts of voluntary and involuntary responses by respondent and operant responses. This is understandable in virtue of the connotations of creaking, worn-out concepts, and this same revolt against "loaded" terminology has occurred before in the history of psychology, psychiatry, and philosophy.

According to Skinner, respondent responses are elicited by known stimuli. Such responses include eyeblink, salivation, and knee jerk. Operant responses are emitted responses and are not invariable in terms of known stimuli. Such responses would include playing golf, writing psychological theories, etc.

Skinner speaks of two types of conditioning: Type *S*, which involves respondent behavior and into which category so-called classical conditioning mostly fits, and Type *R*, which involves operant behavior and into which category so-called instrumental conditioning fits. Personally, we prefer his terminology because of the inclusion of two factors and avoidance of the distracting, disconcerting terms "classical" and "instrumental." Type *S*, he believes, is autonomic, while Type *R* is skeletal. If this is true, then, the eye blink and knee jerk responses which are skeletal responses should be operant and Type *R*, which contradicts what he has said in calling them respondent.

Let us return to the concepts of voluntary and involuntary. We believe that there is something modest and original in not wanting to invent new terminology if humanly possible. On the other hand, terms such as these are man's handiworks although not necessarily his masterpieces, and their distinction is quite complex. We have spoken of the voluntary response as being checkable and the involuntary response as being uncheckable. The patellar reflex is an example of the latter, and the simple act of raising one's hand in a classroom is an example of the former. These are uncomplicated but there are many which are not.

What about an alcoholic who states that he just cannot resist drinking a glass of whisky set before him? He will maintain that his grabbing and drinking response is uncheckable, which appears to contradict our contention. Yet this same alcoholic will more than likely check this response for the moment, at least, if you point a gun at him and threaten to shoot if he moves. Still, under almost any conditions, if you blow a puff of air in his eye, he will be forced to respond regardless of any threat. This is the type of uncheckable response we are referring to. The kleptomaniac maintains that his responses are uncheckable but we are able to distinguish this from salivation or eyeblink.

Hilgard and Marquis, Chap. 11 (6), devote an entire chapter to the discussion of voluntary and involuntary responses. They call our attention to the fact that "the term 'voluntary' has never been rigorously defined. If it is taken to mean activity under the control of the will, this leaves the mystery of the will to be explained. Neural definitions, which identify volition with control by 'higher' brain centers, are unsatisfactory because these centers are now known to be involved in types of automatic behavior which do not conform at all to the generally accepted meaning of voluntary."

This is certainly true, but there is hardly any term in all of the literature of psychology which has ever been rigorously defined and perhaps there never will be. The authors point to a scale which at one end involves unquestionable voluntary behavior and at the other end unquestionable involuntary behavior and state that all behavior falls somewhere on this scale. Who can question this? One of the few laws we can be at all certain of in psychology is that "There is no dichotomy in nature." It would be just as foolish to maintain that since all people fall into a scale between idiot and genius, we must never make the distinction between stupid and intelligent ones. The same reasoning applies to the concepts of voluntary and involuntary. We recognize that, in human behavior, most responses will not be pristinely pure voluntary or involuntary but that they will certainly fall at one or the other end of this scale. Hilgard and Marquis point out that involuntary responses show what Hull calls "oscillation"; sometimes they work and sometimes they do not. They also point out that conditioned voluntary responses can be established. They speak about conditioning in situations where the response generally classed as involuntary may be voluntary, such as the deliberate eyeblink or knee jerk, when the signal is given.

Despite the fact that there are different degrees of voluntary control, voluntary control may be acquired and, under certain conditions, certain reflexes may become ineffective. We are rendered quite unintelligible without at least two factors in relating simple forms of learning to complicated ones. Behavior in general cannot be explained in terms of a one-factor theory. There is nothing in Hilgard and Marquis that suggests this, although some readers may have misinterpreted them.

Whether the terms "voluntary" and "involuntary" or "respondent" and "operant" are used is of secondary importance. The gap between the so-called classical and super classical conditioning situations will never, in our opinion, be bridged by a one-factor theory. Oversimplification merely leaves us with original confusion; distinction between observable and measurable differences in behavior offers fruitful possibilities for its understanding.

C. SUMMARY

We have attempted to present a survey of elements of conditioning in various areas of normal and pathological human behavior. These areas include *The Acquisition of Tastes, Perceiving, Language, Fears and Phobias, The Lie Detector Situation, The Psychopathic State, Hypnosis, Hysteria, Compulsions, Psychotherapy*, and *Higher Learning*. We are not pretending to expound a formal or completed theory nor are we endeavoring to trace each step of behavior from lowest to highest forms. In a spirit largely speculative we have hoped to point out that conditioning can be viewed as other than the very simple reflex arc, and that stimulus complexes may become quite intricate indeed. However, the common denominators of a stimulus which produces a specific response, and another contiguously related to the first which now elicits a response similar to that elicited by the first, can be found in all the areas mentioned as well as many others. Further experimentation along these lines may uncover knowledge of behavior which will clear up some of the semantic difficulties which envelop much psychological theory today.

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